

## Scandinavian Airlines System

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
CHAPTER 49 TAB			49-11-00		CONT.	49-11-01		CONT.
AIRBORNE AUXILIARY POWER			213	APR 22/03	03	R 417	AUG 22/09	22.1
EFFECTIVE PAGES			214	APR 22/03	02	R 418	AUG 22/09	08.1
SEE LAST PAGE OF LIST FOR			215	APR 22/03	03	419	APR 22/09	07
NUMBER OF PAGES			216	APR 22/03	01	420	DEC 22/08	11
49-CONTENTS			217	DEC 22/08	01	421	AUG 22/05	09
1	APR 22/09	SAS	218	DEC 22/08	02	422	DEC 10/98	05
2	AUG 22/01	SAS	219	DEC 22/08	03	423	AUG 22/01	01
3	AUG 22/01	SAS	220	DEC 22/08	02	424	DEC 22/05	08
R 4	AUG 22/09	SAS.101	221	APR 22/03	05	425	NOV 10/97	02
5	AUG 22/01	SAS	222	DEC 10/98	01	426	DEC 10/98	01
6	AUG 22/01	SAS	223	DEC 10/98	01	427	DEC 10/98	01
R 7	AUG 22/09	SAS.1	224	APR 22/04	02	428	DEC 10/98	01
8	AUG 22/04	SAS	225	DEC 22/08	03	429	DEC 22/05	04
R 9	AUG 22/09	SAS.1	226	DEC 22/08	03	430	AUG 22/05	03
10	DEC 22/05	SAS	227	DEC 22/08	01	431	AUG 22/05	11
11	AUG 22/07	SAS	228	DEC 22/05	02	432	AUG 22/05	07
12	AUG 22/07	SAS	229	DEC 22/04	01	433	AUG 22/05	07
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4	DEC 22/07	01	504	APR 22/99	01	204	MAY 10/90	01
5	MAY 10/92	01	505	AUG 22/01	03	205	MAY 10/90	01
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8	APR 22/06	02	508	APR 22/09	04	208	AUG 22/99	01
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			413	AUG 22/05	06			
			414	AUG 22/04	16			
			415	AUG 22/04	17			
			416	APR 22/05	21			

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33

AUG 22/09

# D633T133

CHAPTER 49

EFFECTIVE PAGES

PAGE 1

CONTINUED



**BOEING**  
767  
MAINTENANCE MANUAL

Scandinavian Airlines System

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
49-13-01			49-15-00			49-15-06		
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406	APR 22/08	02	49-15-01			406	AUG 22/01	08
407	APR 22/03	04	401	AUG 22/05	01	407	AUG 22/05	03
408	APR 22/04	04	402	AUG 22/07	02	408	AUG 22/05	03
409	AUG 22/01	03	403	DEC 22/02	04	409	AUG 22/05	03
410	AUG 22/99	01	404	DEC 22/02	03	410	AUG 22/01	03
411	APR 22/08	02	405	DEC 22/02	02	411	AUG 22/01	04
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406	AUG 22/01	01	404	AUG 22/05	01	402	APR 22/99	02
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3	DEC 22/02	06	407	AUG 22/01	03	103	DEC 22/07	05
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F = FOLDOUT PAGE  
33  
AUG 22/09

**D633T133**

CHAPTER 49  
EFFECTIVE PAGES  
PAGE 2  
CONTINUED

Scandinavian Airlines System

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
49-16-00		CONT.	49-27-00			49-27-04		
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5	MAY 10/92	01	404	AUG 22/05	01			
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5	DEC 22/07	05	49-27-03			405	AUG 22/05	04
6	DEC 22/07	10	601	AUG 22/01	04	406	AUG 22/02	05
7	MAY 10/92	02	602	AUG 22/01	03	407	AUG 22/02	06
8	DEC 22/07	03	603	AUG 22/01	01	408	AUG 22/02	06
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						403	AUG 22/01	02
						404	APR 22/08	02

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F = FOLDOUT PAGE

33

AUG 22/09

**D633T133**

CHAPTER 49

EFFECTIVE PAGES

PAGE 3

CONTINUED



**BOEING**  
767  
MAINTENANCE MANUAL

Scandinavian Airlines System

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
49-27-09		CONT.	49-27-15			49-31-03		CONT.
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405	AUG 22/05	03	8	FEB 10/95	02	402	MAY 10/91	01
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33  
AUG 22/09

**D633T133**

CHAPTER 49  
EFFECTIVE PAGES  
PAGE 4  
CONTINUED

Scandinavian Airlines System

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
49-31-09			49-41-02			49-41-06	CONFIG 2	CONT.
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49-31-10			702	DEC 10/98	01	49-41-06	CONFIG 2	
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			403	DEC 22/07	01	407	AUG 22/01	01
			404	AUG 22/05	01	408	AUG 22/01	03

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F = FOLDOUT PAGE

33

AUG 22/09

**D633T133**

CHAPTER 49

EFFECTIVE PAGES

PAGE 5

CONTINUED



**BOEING**  
767  
MAINTENANCE MANUAL

Scandinavian Airlines System

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
49-51-03			49-53-00		CONT.	49-53-05		CONT.
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602	APR 22/99	01	6	AUG 22/04	01	406	AUG 22/05	02
49-52-00			7	AUG 22/04	02	49-53-06		
1	DEC 22/01	01	8	BLANK		201	AUG 22/01	01
2	DEC 22/01	01	49-53-00			202	NOV 10/94	01
3	MAY 10/92	01	101	AUG 10/91	01	203	AUG 22/01	03
4	NOV 10/87	02	102	AUG 22/04	01	204	AUG 22/05	02
5	MAY 10/92	01	103	AUG 22/04	01	205	AUG 22/01	03
6	NOV 10/87	01	104	BLANK		206	AUG 10/91	01
7	FEB 10/95	02	49-53-01			207	AUG 22/01	01
8	BLANK		401	AUG 22/05	03	208	AUG 22/01	01
49-52-00			402	APR 22/07	01	49-53-07		
101	FEB 10/92	01	403	DEC 22/07	01	401	AUG 22/01	01
102	FEB 10/92	01	404	APR 22/07	03	402	AUG 22/01	01
49-52-01			405	APR 22/07	02	403	AUG 22/01	01
401	AUG 22/01	01	406	APR 22/07	01	404	AUG 22/01	03
402	FEB 10/95	01	407	DEC 22/07	01	405	AUG 22/05	01
403	FEB 10/95	01	408	APR 22/07	03	406	AUG 22/05	03
404	AUG 22/01	03	409	APR 22/07	02	407	AUG 22/01	02
405	AUG 22/05	01	410	BLANK		408	BLANK	
406	AUG 22/01	03	49-53-02			49-53-08		
49-52-01			401	AUG 22/01	01	401	APR 22/04	01
501	AUG 22/01	01	402	AUG 22/01	01	402	APR 22/04	04
502	DEC 22/07	01	403	AUG 22/01	01	403	DEC 22/03	01
503	FEB 10/95	01	404	AUG 22/01	03	404	AUG 22/04	01
504	AUG 22/01	03	405	AUG 22/05	01	405	APR 22/04	01
505	AUG 22/01	03	406	AUG 22/05	01	406	AUG 22/07	01
506	AUG 22/01	02	407	AUG 22/05	03	407	DEC 22/07	01
49-52-02			408	BLANK		408	APR 22/04	03
401	AUG 22/01	01	49-53-03			409	APR 22/04	01
402	AUG 10/91	02	201	AUG 22/01	01	410	BLANK	
403	NOV 10/93	03	202	FEB 10/96	01	49-53-08		
404	AUG 22/01	02	203	AUG 22/01	03	701	DEC 22/05	01
405	DEC 22/03	04	204	AUG 22/05	01	702	DEC 22/05	03
406	AUG 22/05	02	205	AUG 22/01	01	703	DEC 22/05	01
407	DEC 22/03	03	206	DEC 22/07	03	704	DEC 22/05	01
408	DEC 22/03	02	207	APR 22/00	01	705	AUG 22/06	03
409	DEC 22/03	02	208	BLANK		706	DEC 22/06	01
410	BLANK		49-53-04			49-61-00		
49-52-03			401	AUG 22/01	04	1	FEB 10/97	01
401	AUG 22/01	01	402	AUG 22/01	01	2	MAY 10/92	01
402	AUG 22/04	04	403	AUG 22/01	01	3	NOV 10/93	06
403	DEC 22/03	02	404	DEC 22/07	03	4	AUG 22/04	11
404	AUG 22/05	03	405	AUG 22/01	01	5	APR 22/01	03
405	AUG 22/05	02	406	AUG 22/05	01	6	DEC 22/05	02
406	AUG 22/05	02	407	AUG 22/01	03	7	DEC 22/03	02
49-53-00			408	AUG 22/05	02	8	APR 22/01	05
1	AUG 22/04	01	49-53-05			9	APR 22/01	08
2	DEC 22/01	01	401	AUG 22/01	01	10	APR 22/04	02
3	DEC 22/00	01	402	AUG 10/91	02			
4	AUG 22/04	01	403	AUG 22/01	04			
			404	AUG 22/05	01			

R = REVISED, A = ADDED OR D = DELETED  
F = FOLDOUT PAGE  
33  
AUG 22/09

**D633T133**

CHAPTER 49  
EFFECTIVE PAGES  
PAGE 6  
CONTINUED

Scandinavian Airlines System

PAGE	DATE	CODE	PAGE	DATE	CODE	PAGE	DATE	CODE
49-61-00			49-71-01			49-81-03		
101	FEB 10/92	01	601	DEC 22/07	01	401	AUG 22/01	01
102	FEB 10/92	01	602	BLANK		402	AUG 22/05	03
49-61-02			49-71-01			403	DEC 22/03	01
401	AUG 22/01	01	801	AUG 22/08	01	404	AUG 22/05	03
402	MAY 10/91	01	802	DEC 22/08	01	49-94-00		
403	DEC 22/02	04	803	DEC 22/08	01	1	DEC 22/01	03
404	AUG 22/05	01	804	AUG 22/07	01	2	DEC 22/01	06
405	APR 22/04	04	49-72-00			3	MAY 10/92	01
406	BLANK		1	DEC 22/01	12	4	AUG 10/96	15
49-61-03			2	BLANK		49-94-00		
401	AUG 22/01	03	49-72-00			101	AUG 22/99	03
402	APR 22/99	01	101	AUG 22/03	01	102	MAY 10/94	02
403	AUG 22/01	02	102	APR 22/99	02	49-94-01		
404	AUG 22/05	01	49-72-01			401	AUG 22/01	03
405	AUG 22/01	03	401	AUG 22/03	05	402	MAY 10/91	01
406	BLANK		402	AUG 22/03	01	403	AUG 22/01	03
49-61-04			403	AUG 22/05	01	404	AUG 22/05	01
201	AUG 22/01	01	404	AUG 22/05	05	405	AUG 22/05	04
202	MAY 10/91	01	49-73-00			406	BLANK	
203	AUG 22/01	03	1	MAY 10/92	01	49-94-02		
204	AUG 22/05	01	2	NOV 10/95	10	401	AUG 22/01	01
205	AUG 22/01	03	49-81-00			402	DEC 10/98	01
206	APR 22/99	01	1	MAY 10/96	01	403	AUG 22/01	03
49-61-05			2	DEC 22/05	01	404	AUG 22/05	01
201	AUG 22/01	04	49-81-00			405	DEC 22/07	04
202	AUG 22/99	03	101	APR 22/99	02	406	BLANK	
203	DEC 10/98	03	102	APR 22/99	02	49-94-02		
R 204	AUG 22/01	04.1	49-81-01			601	APR 22/05	01
205	AUG 22/07	05	401	AUG 22/01	01	602	BLANK	
206	BLANK		402	APR 22/99	01	49-94-04		
49-61-05			403	DEC 22/04	04	401	AUG 22/01	02
401	DEC 22/07	05	404	AUG 22/05	01	402	DEC 10/98	02
402	AUG 22/99	03	405	AUG 22/05	03	403	AUG 22/05	02
403	DEC 22/08	03	406	BLANK		404	BLANK	
404	DEC 22/08	08	49-81-01			49-94-04		
49-71-00			401	AUG 22/01	01	601	AUG 22/05	02
1	MAY 10/92	01	402	APR 22/99	01	602	BLANK	
2	FEB 10/95	02	403	DEC 22/04	04	49-94-04		
49-71-00			404	AUG 22/05	01	401	AUG 22/01	02
101	AUG 10/94	01	405	AUG 22/05	03	402	DEC 10/98	02
102	DEC 22/04	01	406	BLANK		403	AUG 22/05	02
49-71-01			49-81-02			404	BLANK	
401	AUG 22/01	01	401	AUG 22/01	01	49-94-04		
402	APR 22/99	01	402	APR 22/99	01	601	AUG 22/05	02
403	AUG 22/05	03	403	AUG 22/05	01	602	BLANK	
404	AUG 22/05	01	404	AUG 22/05	01	49-94-04		
405	AUG 22/05	03				601	AUG 22/05	02
406	BLANK					602	BLANK	

R = REVISED, A = ADDED OR D = DELETED

F = FOLDOUT PAGE

33

AUG 22/09

**D633T133**

CHAPTER 49

EFFECTIVE PAGES

PAGE 7

LAST PAGE

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
<u>AIRBORNE AUXILIARY POWER</u>	49-00-00		
DDG Maintenance Procedures		901	ALL
DDG 49-15-1 Preparation - APU		901	
Air Intake Door Inoperative			
DDG 49-15-1 Restoration - APU		903	
Air Intake Door Inoperative			
DDG 49-94-1 Preparation - APU		904	
OIL QTY Indication			
DDG 49-94-1 Restoration - APU		905	
OIL QTY Indication			
<u>POWER PLANT</u>	49-10-00		
UNIT - AUXILIARY POWER	49-11-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Auxiliary Power Unit		1	
APU Ground Safety		5	
Precautions			
Operation		6	
BITE		8	
Functional Description		6	
Component Location		101	ALL
Component Index			
Component Location			
Maintenance Practices		201	ALL
Adjustment/Test		501	ALL
Inspection/Check		601	ALL
UNIT - AUXILIARY POWER	49-11-02		
Maintenance Practices		201	ALL
UNIT - AUXILIARY POWER	49-11-01		
Removal/Installation		401	ALL
Installation - APU (Fishpole		412	
Hoist Procedure)			
Installation - APU		430	
(Hydraulic Jack Procedure)			
Removal - APU (Fishpole		401	
Hoist Procedure)			
Removal - APU (Hydraulic		420	
Jack Procedure)			





**BOEING**  
767  
MAINTENANCE MANUAL

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
MOUNTS - APU	49-13-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
APU Mount Brackets		2	
APU Support and Vibration		1	
Isolator Mounts (Shockmounts)			
Lifting Pad		2	
Overhead Hoisting Mounts		2	
Component Location		101	ALL
Component Index			
Component Location			
Inspection/Check		601	ALL
BRACKET - APU MOUNTING	49-13-03		
Removal/Installation		401	ALL
SUPPORT AND SHOCKMOUNT - APU AFT	49-13-02		
Removal/Installation		401	ALL
SUPPORT AND SHOCKMOUNT - APU FORWARD	49-13-01		
Removal/Installation		401	ALL
HARNESS - APU	49-14-00		
Inspection/Check		601	ALL
INTAKE - AIR	49-15-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Air Intake Door		2	
Air Intake Door Actuator		3	
Air Intake Door Seal		2	
Air Intake Ducts		3	
Air Intake Plenum		4	
Air Intake Port		1	
Air Intake Port Seal		2	
Operation		4	
BITE		4	
Functional Description		4	
Component Location		101	ALL
Component Index			
Component Location			
Adjustment/Test		501	ALL
ACTUATOR - AIR INTAKE DOOR	49-15-06		
Removal/Installation		401	ALL

49-CONTENTS

SAS

Page 2  
Aug 22/01

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	<u>Chapter Section Subject</u>	<u>Page</u>	<u>Effectivity</u>
Adjustment/Test		501	ALL
DOOR - AIR INTAKE	49-15-05		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
DUCT - AIR INTAKE	49-15-01		
Removal/Installation		401	ALL
PLENUM - AIR INTAKE	49-15-03		
Inspection/Check		601	ALL
PORT - AIR INTAKE	49-15-08		
Removal/Installation		401	ALL
SEAL - AIR INTAKE DOOR	49-15-07		
Removal/Installation		401	ALL
SEAL - AIR INTAKE PLENUM FLANGE	49-15-04		
Removal/Installation		401	ALL
SEAL - AIR INTAKE PORT	49-15-09		
Removal/Installation		401	ALL
SWITCH - AIR INTAKE DOOR OPEN	49-15-02		
Removal/Installation		401	ALL
DRAINS AND VENTS - APU	49-16-00		
Description and Operation		1	ALL
General		1	
APU Drains and Vents		1	
Component Location		101	ALL
Component Index			
Component Location			
Inspection/Check		601	ALL
DRAIN - APU PLENUM	49-16-03		
Inspection/Check		601	ALL
VALVE - COMBUSTOR DRAIN PRESSURE RELIEF	49-16-01		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
<u>ENGINE</u>	49-20-00		



**BOEING**  
767  
MAINTENANCE MANUAL

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
ENGINE - APU	49-21-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Gearbox		4	
Load Compressor		3	
Power Section		1	
Operation		5	
BITE		6	
Functional Description		5	
Inspection/Check		601	ALL
SYSTEM - APU AND GENERATOR	49-27-00		
LUBRICATION			
Description and Operation		1	ALL
General		1	
Component Details		1	
APU Lubrication		1	
Generator Lubrication		9	
Operation		9	
BITE		11	
Functional Description		9	
Component Location		101	ALL
Component Index			
Component Location			
APU Oil Change (Replace With the Same or Different Brand Name and Same Type of Oil)		301	
APU Oil Change (Replace With a Different Type of Oil)		301	
Inspection/Check		601	ALL
COOLER - OIL	49-27-09		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
Cleaning/Painting		701	ALL
ELEMENTS - LUBE AND GENERATOR	49-27-03		
SCAVENGE FILTER			
Removal/Installation		401	ALL
Inspection/Check		601	ALL
INDICATOR - GENERATOR FILTER	49-27-16		
DIFFERENTIAL PRESSURE			
Removal/Installation		401	ALL

49-CONTENTS

SAS.101

Page 4

Aug 22/09

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	<u>Chapter Section Subject</u>	<u>Page</u>	<u>Effectivity</u>
INDICATOR - LUBE FILTER DIFFERENTIAL PRESSURE Removal/Installation	49-27-07	401	ALL
PLATE - APU GENERATOR SEAL Removal/Installation Inspection/Check	49-27-06	401 601	ALL ALL
PLUG - MAGNETIC CHIP DETECTORS AND DRAIN Removal/Installation Inspection/Check	49-27-04	401 601	ALL ALL
PUMP - GENERATOR SCAVENGE Removal/Installation	49-27-02	401	ALL
PUMP - LUBE Removal/Installation	49-27-01	401	ALL
REGULATOR - OIL PRESSURE Removal/Installation	49-27-05	401	ALL
SWITCH - GENERATOR FILTER DIFFERENTIAL PRESSURE Removal/Installation	49-27-15	401	ALL
SWITCH - LOW OIL TEMPERATURE Removal/Installation	49-27-14	401	ALL
VALVE - DE-OIL SOLENOID Removal/Installation	49-27-08	401	ALL
VALVE - GEARBOX PRESSURE REGULATING Removal/Installation	49-27-12	401	ALL
VALVE - GEARBOX SHUTOFF Removal/Installation	49-27-11	401	ALL
VALVE - OIL COOLER BYPASS Removal/Installation	49-27-10	401	ALL
VALVE - SHUTTLE Removal/Installation	49-27-13	401	ALL
<u>ENGINE FUEL AND CONTROL</u>	49-30-00		



**BOEING**  
767  
MAINTENANCE MANUAL

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
SYSTEM - APU FUEL	49-31-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Flow Divider		5	
Fuel Control Unit		1	
Manifolds		5	
Nozzles		5	
Operation		7	
BITE		8	
Functional Description		7	
Component Location		101	ALL
Component Index			
Component Location			
Maintenance Practices		201	ALL
ELEMENT - FUEL FILTER	49-31-04		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
ELEMENT - FUEL FLOW DIVIDER FILTER	49-31-08		
Maintenance Practices		201	ALL
FILTER - HIGH PRESSURE FUEL	49-31-07		
Maintenance Practices		201	ALL
HOSES - FUEL MANIFOLD	49-31-09		
Removal/Installation		401	ALL
INDICATOR - FUEL FILTER DIFFERENTIAL PRESSURE	49-31-10		
Removal/Installation		401	ALL
MANIFOLD AND NOZZLES - FUEL	49-31-06		
Removal/Installation		401	ALL
UNIT - FUEL CONTROL	49-31-01		
Removal/Installation		401	ALL
VALVE - FUEL CONTROL SOLENOID	49-31-02		
Removal/Installation		401	ALL
VALVE - FUEL FILTER BYPASS	49-31-05		
Removal/Installation		401	ALL
VALVE - FUEL FLOW DIVIDER AND SOLENOID	49-31-03		
Removal/Installation		401	ALL
<u>IGNITION/STARTING</u>	49-40-00		

49-CONTENTS

SAS

Page 6  
Aug 22/01

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	<u>Chapter Section Subject</u>	<u>Page</u>	<u>Effectivity</u>
SYSTEM - APU IGNITION AND STARTING	49-41-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Igniter Plug		1	
Ignition Lead		1	
Ignition Unit		1	
Starter Motor		1	
Operation		4	
BITE		6	
Functional Description		4	
Component Location		101	ALL
Component Index			
Component Location			
CLUTCH - STARTER	49-41-06		
Removal/Installation		401	CONFIG 1 [*]
[*] APU WITHOUT GEARBOX 3862180-13 OR -19			
Removal/Installation		401	CONFIG 2 [*]
[*] APU WITH GEARBOX 3862180-13 OR -19			
Inspection/Check		601	CONFIG 1 [*]
[*] APU WITHOUT GEARBOX 3862180-13 OR -19			
Inspection/Check		601	CONFIG 2 [*]
[*] APU WITH GEARBOX 3862180-13 OR -19			
CONTACTOR - APU CRANK	49-41-05		
Removal/Installation		401	ALL
LEAD - IGNITION	49-41-04		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
MOTOR - STARTER	49-41-01		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
PANEL - APU CONTROL	49-41-81		
Removal/Installation		401	ALL
PLUG - IGNITER	49-41-02		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
Cleaning/Painting		701	ALL
UNIT - IGNITION	49-41-03		
Removal/Installation		401	ALL



**BOEING**  
767  
MAINTENANCE MANUAL

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
<u>AIR</u>	49-50-00		
SYSTEM - APU COOLING AIR	49-51-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Compartment Cooling and Ventilation		5	
Cooling Air Duct for the Oil		5	
Cooling Fan		1	
Fan Isolation Valve		1	
Operation		6	
BITE		7	
Functional Description		6	
Component Location		101	ALL
Component Index			
Component Location			
DUCT - OIL COOLING AIR	49-51-01		
Removal/Installation		401	ALL
FAN - COOLING	49-51-03		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
VALVE - FAN ISOLATION	49-51-02		
Removal/Installation		401	[*]
[*] APU PRE-HONEYWELL-SB 49-7391			
SYSTEM - APU BLEED AIR	49-52-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Actuator for the Inlet Guide Vanes		1	
Inlet Guide Vanes (IGV)		1	
Operation		1	
BITE		7	
Functional Description		1	
Component Location		101	ALL
Component Index			
Component Location			
ACTUATOR - INLET GUIDE VANE	49-52-02		
Removal/Installation		401	ALL

49-CONTENTS

SAS

Page 8  
Aug 22/04

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	<u>Chapter Section Subject</u>	<u>Page</u>	<u>Effectivity</u>
BEARING - INLET GUIDE VANE	49-52-01		
LINKAGE ROD END			
Removal/Installation		401	ALL
Adjustment/Test		501	ALL
BELLCRANK - INLET GUIDE VANE	49-52-03		
LINKAGE			
Removal/Installation		401	ALL
SYSTEM - APU SURGE BLEED	49-53-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Pressure Sensors		1	
Pressure Transducers		6	
Surge Valve		1	
Operation		7	
BITE		7	
Functional Description		7	
Component Location		101	ALL
Component Index			
Component Location			
CHAMBER - VARIABLE VOLUME	49-53-07		
Removal/Installation		401	ALL
ELEMENT - SURGE VALVE FILTER	49-53-06		
Maintenance Practices		201	ALL
MODULE - FLOW SENSING	49-53-08		
Removal/Installation		401	[*]
[*] APU WITH THE FLOW SENSING MODULE			
Cleaning/Painting		701	[*]
[*] APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711)			
SENSOR - STATIC PRESSURE	49-53-05		
Removal/Installation		401	[*]
[*] APU WITHOUT THE FLOW SENSING MODULE			
SENSOR - TOTAL PRESSURE FLOW	49-53-03		
Maintenance Practices		201	[*]
[*] APU WITHOUT THE FLOW SENSING MODULE			
TRANSDUCER - DIFFERENTIAL PRESSURE	49-53-04		
Removal/Installation		401	ALL





**BOEING**  
767  
MAINTENANCE MANUAL

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
TRANSDUCER - TOTAL PRESSURE	49-53-02		
Removal/Installation		401	ALL
VALVE - SURGE CONTROL	49-53-01		
Removal/Installation		401	ALL
<u>ENGINE CONTROLS</u>	49-60-00		
SYSTEM - APU CONTROL	49-61-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
APU Control Panel		1	
APU Control Relays		6	
APU Control Unit (ECU)		4	
APU Shutdown Panel		4	
Inlet Pressure Sensor for the APU		6	
Inlet Temperature Sensor for the APU		6	
Monopole		5	
Power Controls		1	
Operation		7	
APU Normal Shutdown		7	
APU Remote Shutdown		7	
BITE		9	
Protective Shutdown Systems		8	
Component Location		101	ALL
Component Index			
Component Location			
MONOPOLES - APU RPM	49-61-02		
Removal/Installation		401	ALL
SENSOR - APU INLET PRESSURE (P2)	49-61-04		
Maintenance Practices		201	ALL
SENSOR - INLET TEMPERATURE	49-61-03		
Removal/Installation		401	ALL
UNIT - APU CONTROL (ECU)	49-61-05		
Maintenance Practices		201	ALL
Removal/Installation		401	ALL
<u>INDICATING</u>	49-70-00		

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
SYSTEM - APU EXHAUST GAS	49-71-00		
TEMPERATURE INDICATING			
Description and Operation		1	ALL
General		1	
Component Details		1	
Thermocouple Assemblies		1	
Operation		2	
BITE		2	
Functional Description		2	
Component Location		101	ALL
Component Index			
Component Location			
THERMOCOUPLE - EXHAUST GAS	49-71-01		
TEMPERATURE			
Removal/Installation		401	ALL
Inspection/Check		601	ALL
Approved Repairs		801	ALL
SYSTEM - APU INDICATING	49-72-00		
Description and Operation		1	ALL
General		1	
Component Location		101	ALL
Component Index			
Component Location			
TIME TOTALIZER - APU	49-72-01		
Removal/Installation		401	ALL
SYSTEM - APU TACHOMETER	49-73-00		
Description and Operation		1	ALL
General		1	
Operation		1	
BITE		2	
Functional Description		1	
<u>EXHAUST</u>	49-80-00		
SYSTEM - APU EXHAUST	49-81-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Exhaust Duct		1	
Exhaust Duct Insulation		2	
Blanket			
Exhaust Duct Supports		2	



**BOEING**  
767  
MAINTENANCE MANUAL

CHAPTER 49 - AIRBORNE AUXILIARY POWER

TABLE OF CONTENTS

<u>Subject</u>	Chapter Section <u>Subject</u>	<u>Page</u>	<u>Effectivity</u>
Component Location		101	ALL
Component Index			
Component Location			
BLANKET - EXHAUST DUCT INSULATION	49-81-02		
Removal/Installation		401	ALL
DUCT - EXHAUST	49-81-01		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
SEAL - EXHAUST DUCT SUPPORT	49-81-03		
Removal/Installation		401	ALL
<u>OIL</u>	49-90-00		
SYSTEM - APU OIL INDICATING	49-94-00		
Description and Operation		1	ALL
General		1	
Component Details		1	
Differential Pressure Switch for the Generator Oil Filter		1	
Oil Quantity Transmitter		1	
Oil Temperature Sensor		4	
Switch for the Low Oil Pressure		1	
Component Location		101	ALL
Component Index			
Component Location			
SENSOR - OIL TEMPERATURE	49-94-01		
Removal/Installation		401	ALL
SWITCH - LOW OIL PRESSURE	49-94-02		
Removal/Installation		401	ALL
Inspection/Check		601	ALL
TRANSMITTER - OIL QUANTITY	49-94-04		
Removal/Installation		401	ALL
Inspection/Check		601	ALL

49-CONTENTS

SAS

Page 12  
Aug 22/07

AIRBORNE AUXILIARY POWER – DDG MAINTENANCE PROCEDURES

1. General

- A. This procedure contains the maintenance tasks that are necessary for the operation of the airplane as shown in the Minimum Equipment List (MEL). This procedure also contains the maintenance tasks to put the airplane back to its usual condition after the operation with the MEL specifications. These tasks are:
- (1) DDG 49-15-1 Preparation – APU Air Intake Door Inoperative
  - (2) DDG 49-15-1 Restoration – APU Air Intake Door Inoperative
  - (3) DDG 49-94-1 Preparation – APU OIL QTY Indication
  - (4) DDG 49-94-1 Restoration – APU OIL QTY Indication

TASK 49-00-00-009-005

2. DDG 49-15-1 Preparation – APU Air Intake Door Inoperative

A. General

- (1) This task contains maintenance instructions to prepare the airplane for operation under MEL requirement 49-15-1, APU Air Intake Door Inoperative.

**NOTE:** If the door is partially open, it can cause a reverse rotation of the APU with less than usual bearing lubrication. It can be necessary to keep a limit to the time in this configuration. If the door is fully open or fully closed there is no reverse rotation.

B. References

- (1) AMM 29-11-00/201, Hydraulic System

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 313 Stabilizer Torsion Box Compartment – Left
- 314 Stabilizer Torsion Box Compartment – Right

(2) Access Panels

- 312AR Service Access Door
- 314DR Air Inlet Door Panel (Not on all airplanes)
- 314ER Air Inlet Door Panel (Not on all airplanes)
- 822 Aft Cargo Door

D. Procedure

S 869-012

- (1) Do these steps to manually change the position of the door if it is necessary:
- (a) Remove the pressure from the left, right and center hydraulic systems (AMM 29-11-00/201).

EFFECTIVITY

ALL

49-00-00

01

Page 901  
Aug 22/01

- (b) Put the APU master switch to the OFF position.
- (c) Put the LEFT, RIGHT and CENTER TAIL VALVE switches on the Pilots overhead panel, P5, to the OFF position.
  - 1) Attach a DO-NOT-CLOSE tag.
- (d) Put the RIGHT and LEFT STAB TRIM SHUTOFF VALVE switches on the quadrant stand, P10, to the CUTOUT position.
  - 1) Attach a DO-NOT-OPERATE tag.
- (e) Open these circuit breakers on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
  - 1) 11B35, APU CONT
  - 2) 11C12, STAB TRIM SHUTOFF VALVE L
  - 3) 11C13, STAB TRIM SHUTOFF VALVE C
  - 4) 11H17, FLT CONT SHUTOFF TAIL L
  - 5) 11H18, FLT CONT SHUTOFF TAIL C
  - 6) 11H27, FLT CONT SHUTOFF TAIL R
- (f) Open these circuit breakers on the E6 rack in the aft equipment center, P49, and attach a DO-NOT-CLOSE tag:
  - 1) 49C3, APU CONT
  - 2) 49C5, APU INLET DOOR ACTR
- (g) Open the lower service access door to get access to the actuator from in the airplane.
- (h) Manually position the door actuator.
  - 1) Put a 1/4 inch square drive in the manual/electrical selector shaft on the lower end of the actuator.
  - 2) Push and turn counterclockwise (approximately 60 degrees) until the manual drive socket is seen.

**CAUTION:** DO NOT USE TOO MUCH TORQUE ON THE MANUAL DRIVE. IF YOU USE TOO MUCH TORQUE ON THE MANUAL DRIVE, YOU CAN CAUSE DAMAGE TO THE ACTUATOR.

- 3) Install the square drive in the socket.
  - a) Turn clockwise until the air intake door is closed or turn counterclockwise until the air intake door is open.
  - b) Install the square drive in the manual/electric selector shaft.
  - c) Push and turn the square drive clockwise until the manual drive socket is covered.
  - d) Disconnect the electrical connector, D502, for the intake door actuator.
  - e) Put a cap on the electrical connector of the intake door actuator.
  - f) Put the electrical connector for the intake door actuator in a safe location.
- (i) Remove the DO-NOT-OPERATE tags and put the LEFT, RIGHT and CENTER TAIL VALVE switches to the ON position.

EFFECTIVITY

ALL

49-00-00

01

Page 902  
Dec 10/98

- (j) Remove the DO-NOT-CLOSE tag and close these circuit breakers on the overhead circuit breaker panel, P11:
  - 1) 11C12, STAB TRIM SHUTOFF VALVE L
  - 2) 11C13, STAB TRIM SHUTOFF VALVE C
  - 3) 11H17, FLT CONT SHUTOFF TAIL L
  - 4) 11H18, FLT CONT SHUTOFF TAIL C
  - 5) 11H27, FLT CONT SHUTOFF TAIL R
- (k) Remove the DO-NOT-OPERATE tag and put the RIGHT and LEFT STAB TRIM SHUTOFF VALVE switches to the NORM position.
- (l) Remove the DO-NOT-CLOSE tag and close these circuit breakers:
  - 1) On the overhead circuit breaker panel, P11:
    - a) 11B35, APU CONT
  - 2) On the APU Auxiliary Panel, P49:
    - a) 49C3, APU CONT
    - b) 49C5, APU INLET DOOR ACTR
- (m) Put the placard "INTAKE DOOR INOP (OPEN/CLOSED)" on the APU master switch.

TASK 49-00-00-409-009

3. DDG 49-15-1 Restoration - APU Air Intake Door Inoperative

A. General

- (1) This task contains the steps to put the airplane back in its usual condition after operation under MEL requirement 49-15-1.

B. References

- (1) AMM 49-15-06/401, APU Air Intake Door Actuator

C. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
313	Stabilizer Torsion Box Compartment - Left
314	Stabilizer Torsion Box Compartment - Right

(2) Access Panels

312AR	Service Access Door
314DR	Air Inlet Door Panel (Not on all airplanes)
314ER	Air Inlet Door Panel (Not on all airplanes)
822	Aft Cargo Door

D. Procedure

S 909-013

- (1) Replace the APU air intake door actuator (AMM 49-15-06/401).

S 869-014

- (2) Remove the placard "INTAKE DOOR INOP (OPEN/CLOSED)" on the APU master switch.

EFFECTIVITY

ALL

49-00-00

01

Page 903  
Aug 22/01

TASK 49-00-00-009-019

4. DDG 49-94-1 Preparation - APU OIL QTY Indication

A. General

- (1) This task contains deactivation instructions to prepare the airplane for operation under MEL requirement 49-94-1, APU OIL QTY Indication.
- (2) You use the oil level sight gage to check the APU oil level.

B. References

- (1) AMM 12-13-04/301, APU Oil Servicing

C. Access

(1) Locations Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |
| 822   | Aft Cargo Door          |

D. Prepare for the inspection

S 019-015

- (1) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

EFFECTIVITY

ALL

49-00-00

01

Page 904  
Aug 22/01

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

E. Procedure

S 219-016

- (1) Inspect the APU oil level sight gage.

NOTE: Make sure you allow the APU oil to settle for a minimum of five minutes before reading the oil level sight gage.

- (a) Make sure the oil level is at a safe level.

F. Put the Airplane Back to its Usual Condition

S 419-017

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

TASK 49-00-00-009-020

5. DDG 49-94-1 Restoration - APU OIL QTY Indication

A. General

- (1) This task contains the steps to put the airplane back in its usual condition after operation under MEL requirement 49-94-1, APU OIL QTY Indication.

B. References

- (1) FIM 49-11-00/116, EICAS Msg APU OIL QTY Displayed

C. Procedure

S 819-021

- (1) Do this task: EICAS Msg APU OIL QTY Displayed (FIM 49-11-00/101, Fig. 116, Block 1).

EFFECTIVITY

ALL

49-00-00

01

Page 905  
Aug 22/01



AUXILIARY POWER UNIT – DESCRIPTION AND OPERATION

1. General

A. Auxiliary Power Unit (APU) (Fig. 1)

- (1) The APU is a gas turbine engine with one shaft, located in section 48, in the rear of the airplane. The APU provides electrical and pneumatic power for in-flight and ground operations.
- (2) The APU provides electrical power to the airplane by an oil cooled generator. The APU provides pneumatic power by an engine-driven load compressor. The supply of APU electrical power is given priority over APU pneumatic power.
- (3) The APU control panel on the overhead panel P5 contains the APU start/shutdown (master control) switch, APU RUN light, and APU FAULT light. Other APU indication is displayed on the Engine Indication and Crew Alerting System (EICAS) panel (P2). The aft control panel P8 of the pilot has the APU fire handle and bottle discharge light. The APU shutdown panel P40, on the nose landing gear, contains an APU shutdown switch and fire bottle switch. The E6 rack of the aft equipment center holds the APU control unit, battery, and battery charger.

2. Component Details

A. Auxiliary Power Unit

- (1) The auxiliary power unit is a constant speed unit that provides electrical and pneumatic power during airplane ground and in-flight operations. The engine runs at one of two speeds, depending upon airplane system demands (Fig. 2). The APU consists of a gas turbine engine with one shaft, an ac electrical generator driven by the accessory drive gearbox, and controls for safe, automatic, and continuous operation. The ac generator supplies electrical power to the airplane electrical systems (AMM 24-20-00/001). The APU also provides bleed air to the airplane pneumatic systems (AMM 36-10-00/001).
- (2) Two APU access doors are located directly below the APU. The APU is attached to the air intake plenum by three support and vibration isolator mounts. The mounts support the APU vertically, horizontally and axially.

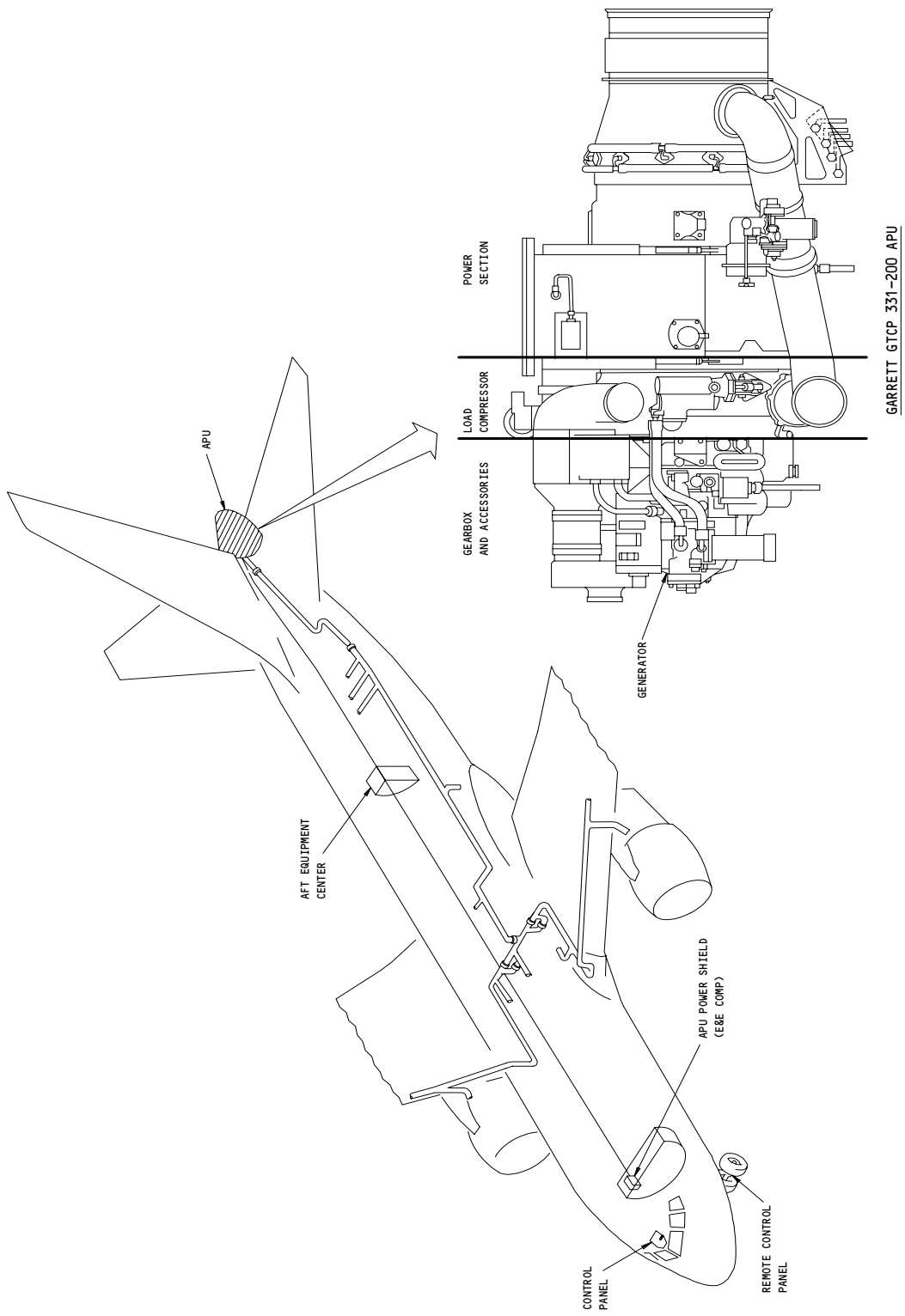
EFFECTIVITY

ALL

49-11-00

01

Page 1  
Dec 22/01



Auxiliary Power Unit Location  
Figure 1

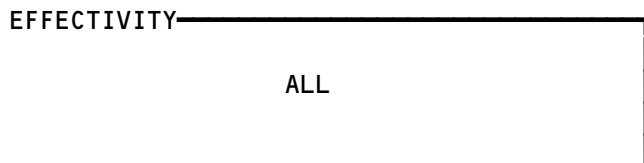
EFFECTIVITY	ALL
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49-11-00

PNEUMATIC DEMAND MODE	SPEED (RPM)	ELECTRICAL POWER (KVA)	BLEED AIR (lb/min)	BLEED AIR PRESSURE (PSIG AT SEA LEVEL)	AMBIENT TEMPERATURE (°F)/(°C)
IDLE	39,850	90	0	0	59/15
DUCT PRESSURIZATION	39,850	90	VARIABLE	33	59/15
ENVIRONMENTAL CONTROL SYSTEM (ECS)(2 PACKS)	39,850	52	180	18	59/15
MAIN ENGINE START (MES)	40,400	60	250	35	59/15
AIR DRIVEN PUMP (ADP)	39,850	52	180	28	59/15
INFLIGHT (INFLT)	40,400	VARIABLE	VARIABLE	VARIABLE	59/15

**NOTE:** THE DATA IN THIS TABLE IS FOR NEW APUs. THIS DATA CAN BE DIFFERENT FOR APUs THAT ARE IN SERVICE. DO NOT USE THE DATA IN THIS TABLE TO FIND IF AN APU OPERATES CORRECTLY.

APU RPM Specifications  
Figure 2



**49-11-00**

- (3) The air intake system of the APU provides air to the engine, cooling fan, and load compressor through a door located on the right side of the fuselage between the horizontal and vertical stabilizers. Ducting leads aft to the APU. The door is opened by an electrical actuator during APU starting and is closed when the APU is shutdown.
- (4) The APU engine consists of three independent, adjoining modules: power section, load compressor, and gearbox. The power section contains a 2-stage centrifugal compressor, an annular combustor, and a 3-stage axial turbine. The main power shaft drives the load compressor, ac generator, and accessory gearbox.
- (5) The APU engine is lubricated by a wet sump system. This is a closed and pressurized system that lubricates and cools the electrical generator and all bearings and gears in the engine. The oil is pressurized in the lube pump, routed through the oil cooler, filtered in the lube pump assembly, and distributed to the generator, gearbox and engine bearings. The oil indicating system monitors oil temperature, low oil pressure, and low oil level.
- (6) The engine fuel system of the APU provides pressurized metered fuel to the combustion chamber and pressurized fuel to the actuator for the inlet guide vanes. The fuel control unit filters, pumps, and meters fuel before it flows to the fuel flow divider and nozzles.
- (7) The APU ignition and starting system accelerates the APU engine and ignites the air-fuel mixture in the engine combustor. The APU control unit automatically de-energizes the starter motor and ignition circuits following the APU starting cycle.
- (8) The cooling air system of the APU provides forced air cooling for the APU engine compartment and APU lubricating oil. Cooling air is forced through the oil cooler while the rest exhausts into the APU engine compartment.
- (9) The bleed air system of the APU provides compressed air for airplane air conditioning, main engine start, air-driven hydraulic pump, and other pneumatic components on the airplane. The pneumatic supply of the APU load compressor is controlled by the position of the inlet guide vanes at the compressor inlet. The guide vane position is electronically controlled by the APU control unit based on airplane pneumatic demand. The surge bleed valve opens to relieve unwanted discharge pressure from the load compressor. The surge bleed air is discharged into the exhaust duct downstream of the turbine section. A total pressure sensor, total pressure transducer, and differential pressure transducer transmit load compressor discharge pressure to the APU control unit. The control unit electronically controls the surge valve based on these pressures.
- (10) The APU controls consist of manual and automatic controls for starting, stopping, and maintaining the APU within safe limits of operation. Once the APU is commanded to start, further control of the unit is fully automatic. The APU can only be started from the overhead panel P5. Shutdown can be accomplished from the overhead panel P11, the aft control panel P8 of the pilot, or the APU shutdown panel P40.

EFFECTIVITY

ALL

49-11-00

01

Page 4  
Dec 22/07

- (11) The APU engine operation is indicated by the exhaust gas indicating system and tachometer system. The temperature indicating system of the APU exhaust gas and the tachometer system provide EGT and RPM indication to the APU control unit and EICAS.
  - (12) The exhaust duct system of the APU carries the APU exhaust out through the tail cone of the airplane. It provides a thermal barrier to shield the APU compartment from exhaust heat.
- B. APU Ground Safety Precautions
- (1) General
    - (a) Operating characteristics of the APU are such that potential injury to personnel and damage to property exists. Personnel must not only avoid the engine intake ducts, but also the exhaust nozzle where hot, high velocity exhaust gases are discharged.
    - (b) Following are some of the general safety items which shall be supplemented according to the needs of the job to prevent accidents.
  - (2) Air Inlet
    - (a) All personnel must avoid areas on top and at rear of APU during ground running operations. When approaching any type of engine, precaution must be taken to keep clear of the intake air stream. The suction near the intake can pull in hats, glasses, loose clothing and wipe-rags from pockets. Any loose articles must be made secure or removed before working around the air inlet.
  - (3) Exhaust characteristics
    - (a) Velocity
      - 1) When working off the ground, with APU operating, a minimum clearance of approximately 40 feet to the rear of the airplane must be allowed to avoid injury to persons or damage to property.
    - (b) Temperature
      - 1) High temperature will be found up to 40 feet from the exhaust nozzle depending on wind conditions. Occasionally when APU is started, excess fuel that has accumulated in the tailpipe ignites and long flames are blown out of the exhaust nozzle. Starts must not be attempted within range of flammable material or fumes.
    - (c) Toxicity
      - 1) Tests have indicated that the carbon monoxide content is low but other gases are present which have a disagreeable odor and are irritating in effect. Exposure will usually cause watering or a burning sensation of the eyes. Less noticeable but important is the respiratory irritation which may be caused. For both these reasons exposure must be avoided, particularly in confined spaces or pockets where the concentration may build up.

EFFECTIVITY

ALL

49-11-00

01

Page 5  
May 10/92

- (4) APU Cool Down
  - (a) After APU operation, care must be taken to ensure that the exhaust and pneumatic ducting have cooled before any work is performed in this area. All other parts may usually be worked on without danger of burn.
- (5) APU Noise
  - (a) The APU produces noise capable of causing temporary, as well as permanent, loss of hearing. Even short exposures to extreme noise may result in damage to the ears. All personnel must use some means of protection. Noise can effect the ear mechanism in such a way as to cause unsteadiness or inability to walk or stand without resting. The use of cup-type ear protection is recommended.
- (6) APU Ignition
  - (a) The APU ignition system contains high voltage components. The system is a hazardous, possibly fatal, source of electrical shock.
- (7) Fuels and Lubricating Oils
  - (a) All fuel and lubricating oils tend to dry the skin, care should be taken to avoid contact with these fluids.
  - (b) Do not operate APU unit within 50 feet of fuel vents. Explosions may result.
- (8) APU Location
  - (a) The distance from the APU to the ground is such that a fall from a workstand could be fatal. Aerostands or platforms must have adequate working space for freedom of movement and must be equipped with protective railings.
- (9) APU Pneumatic Pressure
  - (a) Removal of any component installed in the pneumatic ducts that are forward of the shutoff valve for the APU bleed air near the APU firewall must be done with the APU off. You must make sure that the pneumatic system is depressurized to eliminate possible residual duct pressure.

### 3. Operation

#### A. Functional Description

- (1) AIRPLANES WITHOUT THE TRANSFORMER RECTIFIER UNIT;  
APU fuel is pumped from the left main tank of the airplane. Electrical power for APU starter cranking, APU control circuit, and actuator operation for the air intake door is 28 volts dc, supplied by the APU battery/charger. The main battery supplies airplane power of 28 volts dc.

EFFECTIVITY

ALL

49-11-00

05

Page 6  
Dec 22/00

- (2) AIRPLANES WITH THE TRANSFORMER RECTIFIER UNIT;  
APU fuel is pumped from the left main tank of the airplane. Electrical power for APU starter cranking, APU control circuit, and actuator operation for the air intake door is 28 volts dc, supplied by the APU TRU. With a faulty TRU, a backup power source of 28 volts dc is supplied by the APU battery/charger. The main battery supplies airplane power of 28 volts dc.
- (3) The main battery switch on the P5 overhead panel must be ON for an APU start. The APU control switch on the P5 overhead panel is set to the START position, hold at the START position for one second and manually set to the ON position. As the fuel shutoff valve for the APU opens, the APU FAULT light illuminates indicating valve in transit. If ac power is available, the ac boost pump of the left main tank is used. Otherwise, the dc fuel pump operates from the airplane main battery. The actuator for the air intake door is energized. When the intake door reaches the full open position, the APU control unit receives a ground start/on signal and energizes the start relay supplying 28-volt dc power to the starter motor.
- (4) At 7% engine speed, the APU control unit energizes the ignition unit. For a more complete description of the controls, refer to AMM 49-61-00/001. The fuel shutoff valve for the APU opens allowing fuel to flow to the combustor (AMM 49-31-00/001). With the igniter plug firing, the fuel ignites and the APU begins to accelerate to governed speed.
- (5) AIRPLANES WITH THE APU CONTROL UNIT -17 AND BEFORE;  
At 50% engine speed, the APU control unit de-energizes the starter motor for ground and in-flight starts.
- (6) AIRPLANES WITH THE APU CONTROL UNIT -18 AND SUBSEQUENT;  
At 42% engine speed, the APU control unit de-energizes the starter motor for ground starts. At 55% engine speed, the APU control unit de-energizes the starter motor for in-flight starts.
- (7) At 95% speed the control unit de-energizes the ignition unit. The heat of combustion sustains operation and the engine accelerates until 100% speed is reached. After 95% speed is reached, electrical and pneumatic loading is allowed. Electrical loading is always given priority over pneumatic loading when the exhaust temperature limit of the engine is reached.
- (8) APU normal shutdown is initiated by placing the master control switch from ON to OFF. If the APU was pneumatically loaded, a 60-second delay time occurs before actual shutdown. Shutdown occurs immediately if not loaded. Switching to OFF causes closure of the inlet guide vanes and initiation of the 60 second shutdown time delay. The shutdown time delay is also initiated by closure of the air supply valve. After completion of the 60 second delay, the APU control unit runs a self test of its overtemperature protection logic. A fault is stored in BITE memory if the test fails. Shutdown is accomplished by injecting a 109% test speed signal to the overspeed shutdown circuit of the primary hardware. This de-energizes the fuel solenoid valve. If after 20 seconds the APU speed is above 85%, the APU will shutdown using the protective shutdown (software).

EFFECTIVITY

ALL

49-11-00

02

Page 7  
Apr 22/03

- (9) A normal protective shutdown is initiated by a 107% overspeed or if this fails, by an overtemperature condition. The APU FAULT light is illuminated and the APU control unit stores the cause of the shutdown in its memory. A redundant protective shutdown is initiated by ultimate overtemperature or protective shutdown failure for normal overspeed. The APU will also automatically shutdown at any time due to the following: reverse flow signaled by high inlet temperature of the load compressor, high oil temperature (above 305°F), low oil pressure (below 35 psi), delta pressure switch for the generator filter (above 35 psid), loss of EGT detection, loss of speed detection, fire, air inlet door failed closed, loss of dc power, slow start, no acceleration, overspeed, overtemperature, and no flame.
- (a) When the APU control unit gets a signal for a protective shutdown, the shutdown occurs as follows: The APU shutdown occurs, the fuel shutoff valve closes, the air supply valve closes, and the APU generator circuit goes off.
  - (b) You can do the APU shutdown for a fire emergency from the aft control stand P8 of the pilot or from the fire shutdown panel P40 for the APU on the nose landing gear. When you pull the fire handle on the P8 panel (or push the shutdown switch on the P40 panel), the protective shutdown occurs. This also prepares the fire extinguisher to operate and stops the audible fire signal.
  - (c) For more information on the protective shutdown, refer to the APU Control System - Description and Operation (AMM 49-61-00/001).

**B. BITE**

- (1) The APU control unit has a Built-In Test Equipment (BITE) capability which aids line maintenance in isolating faults. The control unit continuously monitors APU operation and stores any faults encountered. For more detailed information, see APU Control System (AMM 49-61-00/001).

EFFECTIVITY

ALL

49-11-00

02

Page 8  
Apr 22/06

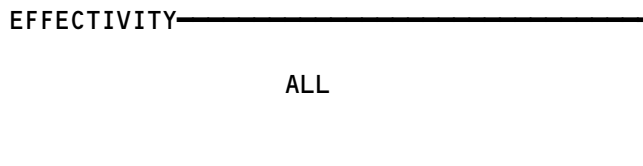



**BOEING**  
 767  
 FAULT ISOLATION/MAINT MANUAL

AUXILIARY POWER UNIT

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
AUXILIARY POWER UNIT	--	1	316AR,315AL, APU COMPT	49-11-01

Auxiliary Power Unit - Component Index  
Figure 101

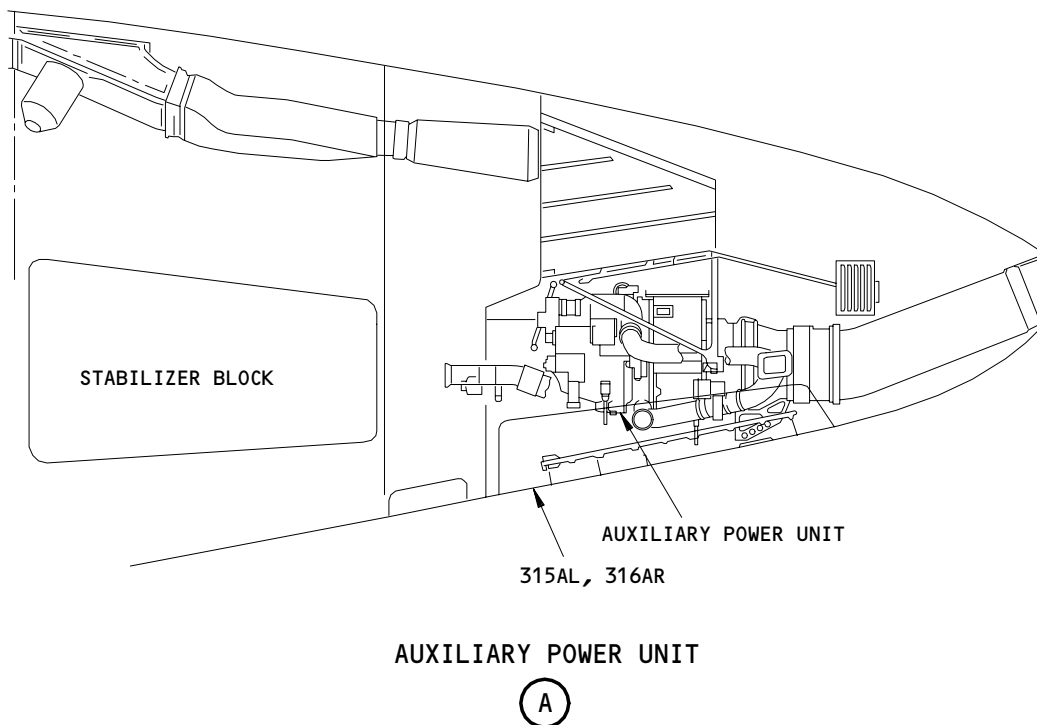
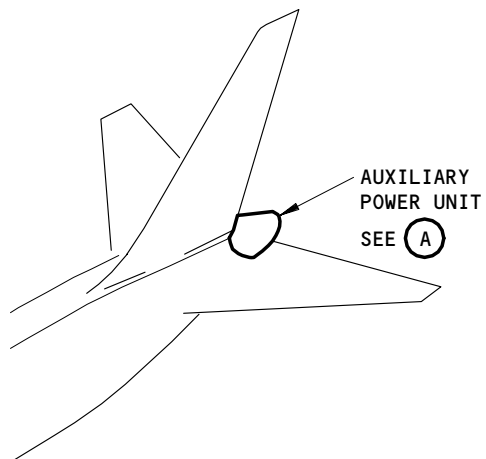


**49-11-00**

01A

Page 101  
Nov 10/94

E61426



Auxiliary Power Unit - Component Location  
Figure 102

EFFECTIVITY	
	ALL

49-11-00

01A

Page 102  
Nov 10/94

AUXILIARY POWER UNIT – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these ten tasks:
  - (1) APU Operation Limits
  - (2) APU Starting and Operation
  - (3) APU Shutdown Procedure
  - (4) Motor the APU
  - (5) APU Preservation (Less Than 45 Days)
  - (6) APU Depreservation (Less Than 45 Days)
  - (7) APU Preservation (45 to 180 Days)
  - (8) APU Depreservation (45 to 180 Days)
  - (9) APU Preservation (More Than 180 Days)
  - (10) APU Depreservation (More Than 180 Days).
- B. Use the APU Operation Limits when you operate or motor the APU. If the APU is not in the specified limits when you operate it, you can cause damage to the APU.
- C. Use the APU Operation Procedure to start and operate the APU.
- D. Use the APU Shutdown Procedure to do shutdowns for the APU.
- E. The APU Motoring Procedure operates the APU without fuel and without the ignition system energized.
- F. The APU preservation Procedure gives protection to the APU when it is not used. The preservation can be done for up to 45 days, 45 to 180 days, or more than 180 days. The APU Operation and the APU Motoring Procedures are used in the APU Preservation Procedure.
- G. The Depreservation Procedure puts the APU back to a serviceable condition after it has been in storage.

TASK 49-11-00-802-001

2. APU Operation Limits

- A. General
  - (1) The APU operation limits and conditions are shown in the table that follows:

**NOTE:** The main fuel tank in the left wing must have 1000 pounds (454 Kg) of fuel to operate the APU for one hour. 500 pounds (227 Kg) of fuel is necessary for each hour the APU operates after the first hour.

EFFECTIVITY

ALL

49-11-00

01

Page 201  
Aug 22/02

Operation Limits for the Auxiliary Power Unit  
Table 201

Condition	Operation Mode	Limit
Temperatures: Compressor Inlet	Any Operation Mode	54°C (130°F) maximum
Oil Temperature	Any Operation Mode	135°C (275°F) maximum
	Overtemperature Shutdown	152°C (305°F)
Fuel Temperature:	Any Operation Mode	-54°C (-65°F) to 49°C (120°F)
Oil Consumption:	Any Operation Mode	Ref Fig. 201
Oil/Fuel Leakage	Any Operation Mode	AMM 49-16-00/601
Air Leakage	Any Operation Mode	Air leakage is permitted at the fuel nozzle. Air leakage is also permitted at the circumferential seal for the turbine heat shield if the air leakage is not pointed at the ignition unit. Air leakage at the circumferential seal, pointed at the ignition unit, is permitted if SB GTCP331-49-7119 is incorporated. SB GTCP331-49-7119 replaces the ignition exciter insulator to protect the ignition exciter from damage. Air pressure from the heat shield can cause high airflow out of the drain mast during usual operation.
Oil Pressure: At the Gearbox	Continuous Operation	65 ± 5 psig
	Low Oil Pressure Shutdown	35 ± 5 psig

EFFECTIVITY

ALL

49-11-00

01

Page 202  
Aug 22/01

Operation Limits for the Auxiliary Power Unit Table 201		
Condition	Operation Mode	Limit
Fuel Pressure: Inlet Pressure	Any Operation Mode	10 to 55 psig
Starter Duty Cycle:	Starter Operation	3 tries to start (maximum) followed by 60 minutes to let the temperature of the starter decrease.
Operating Ranges or Limits for the Auxiliary Power Unit - Conditions That Are Seen on the EICAS Maintenance Page:		
Exhaust Gas Temperature:	Main Engine Start (MES) Mode	471°C (880°F) to 571°C (1060°F) max
	Special MES Mode	471°C (880°F) to 588°C (1090°F) max
	Environmental Control System (ECS) Mode	343°C (650°F) to 538°C (1000°F)
	Maximum Operation Limit	581°C (1078°F) to 588°C (1090°F)
Engine Speed:	Continuous Operation in MES Mode	101%
	Continuous Operation in ECS Mode	99%
	Overspeed Shutdown	107%
	Backup Overspeed Shutdown	109%

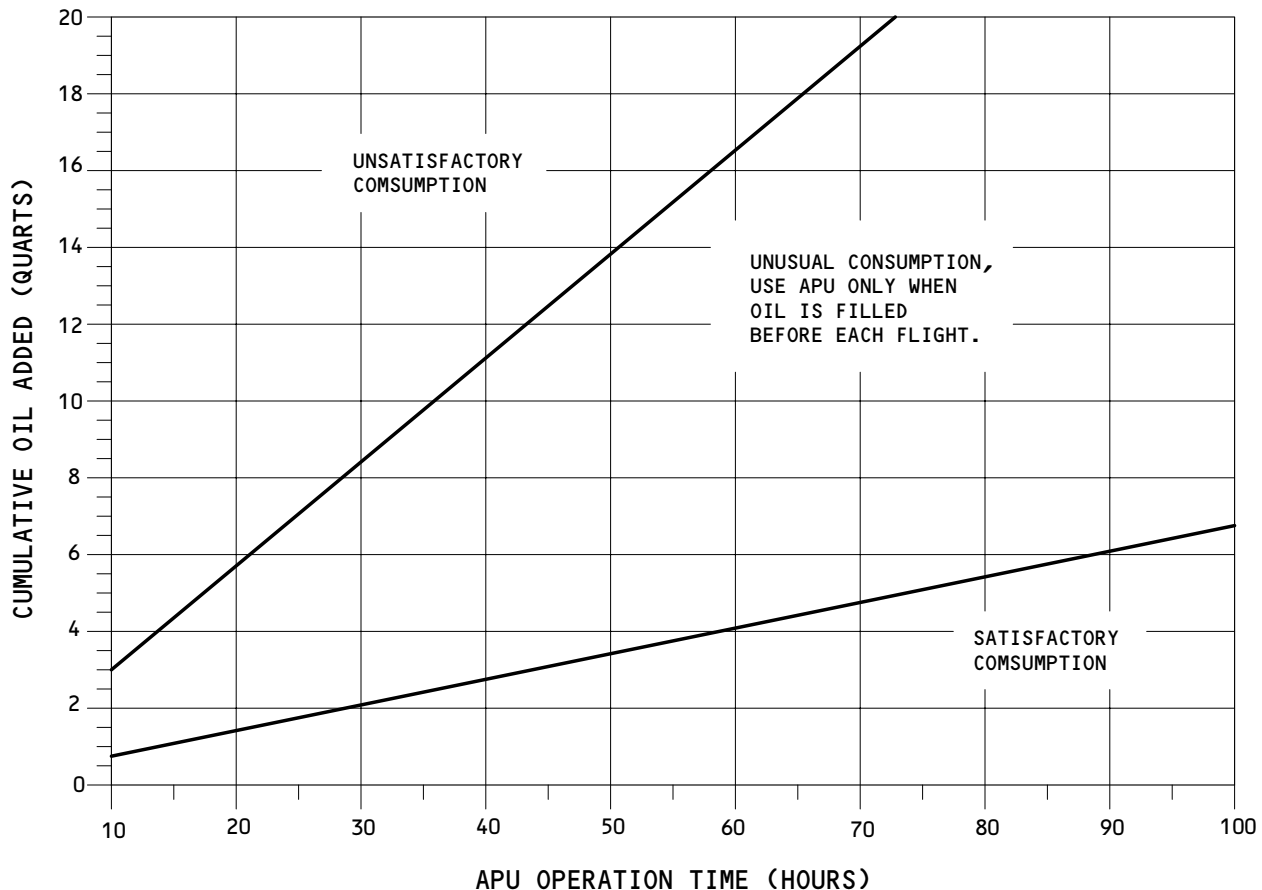
EFFECTIVITY

ALL

49-11-00

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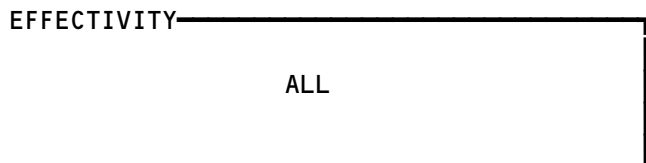
Page 203  
Aug 22/01



**NOTE:** THIS GRAPH IS USED TO MONITOR THE APU OIL CONSUMPTION THROUGH TIME FOR INSTALLED APU'S. THE OIL CONSUMPTION FOR A NEW OR NEWLY OVERHAULED APU IN A TEST CELL IS 10 CC/HR.

USABLE OIL QUANTITY WHEN FILLED = 4.0 QUARTS (3.8 LITERS)  
 USABLE OIL QUANTITY WITH LOQ INDICATION = 1.5 TO 2.0 QUARTS (1.4 TO 1.9 LITERS)

Oil Consumption Limit Graph  
Figure 201



49-11-00

TASK 49-11-00-802-002

3. APU Starting and Operation

A. General

- (1) It is recommended that you do an APU starting and operation procedure at a minimum of one time in a 7 day (weekly) interval if the airplane has not operated and you did not do the APU preservation procedure during this time. You must operate the APU for a minimum of five minutes under a "no-load" condition and then do the APU shutdown procedure. In most conditions, the operation of the APU during this 7 day (weekly) interval will prevent internal/external corrosion and damage to the fuel and oil seals/components.

B. References

- (1) AMM 12-11-01/301, Fuel Tank Pressure Fueling
- (2) AMM 24-22-00/201, Electrical Power - Control
- (3) AMM 36-00-00/201, Pneumatic - General
- (4) AMM 49-61-05/201, APU Control Unit (ECU)

C. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right

(2) Access Panels

822	Aft Cargo Door
-----	----------------

D. Procedure

S 862-145

**CAUTION:** STOP THE APU IF IT DOES NOT OPERATE IN THE LIMITS SPECIFIED IN TABLE 201. IF YOU DO NOT STOP THE APU, DAMAGE TO THE APU ENGINE CAN OCCUR.

- (1) When you operate the APU, make sure it is in the specified limits shown above.

S 862-146

**WARNING:** IF A REFUELING OPERATION IS IN THE AREA, OBEY THE WARNINGS AND CAUTIONS IN THE FUEL TANK PRESSURE FUELING PROCEDURE BEFORE YOU DO THE APU STARTING AND OPERATION PROCEDURE. IF YOU DO NOT OBEY THE WARNINGS AND CAUTIONS, INJURY TO PERSONS CAN OCCUR.

- (2) If there is a refueling operation in the area, make sure you obey the WARNINGS and CAUTIONS in the fuel tank pressure fueling procedure (AMM 12-11-01/301).

S 212-004

- (3) Make sure that no free objects are near the APU inlet.

EFFECTIVITY

ALL

49-11-00

01

Page 205  
Dec 22/04

S 862-005

- (4) Make sure these circuit breakers are closed:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
    - 3) 49C4, APU INLET DOOR ACT
    - 4) 49E3, APU BAT BUS
    - 5) 49E4, APU BAT CHGR
  - (b) P11 Overhead Panel
    - 1) 11A33, IND LIGHTS 1
    - 2) 11B19, FIRE SWITCH UNLOCK
    - 3) 11B24, FIRE DETECTION APU 1
    - 4) 11B25, FIRE DETECTION APU 2
    - 5) 11B34, APU REMOTE FIRE IND
    - 6) 11B35, APU ALTN CONT
    - 7) 11D34, FUEL DC PUMP PWR
    - 8) 11D35, FUEL DC PUMP CONT
    - 9) 11K32, FIRE DETECTION APU
    - 10) 11M25, FUEL PUMPS L FWD R AFT
    - 11) 11S23, APU BLEED PWR
    - 12) 11S24, APU BLEED CONT
    - 13) AIRPLANES WITH TRANSFORMER RECTIFIER UNIT;  
11T35, TRU APU START CONT
  - (c) P6 Circuit Breaker Panel
    - 1) 6E3, FUEL VALVES APU
    - 2) 6G1, APU FIRE EXT 1
    - 3) AIRPLANES WITH DUAL FIRE BOTTLES;  
6G2, APU FIRE EXT 2
    - 4) 6G24, L FWD FUEL BOOST PUMP
    - 5) 6H28, APU HOUR METER
  - (d) P33 Miscellaneous Equipment Panel
    - 1) 33B7, ELECTRICAL POWER P-6 GND SERVICE BUS
    - 2) 33E5, ELECTRICAL POWER BATTERY CHARGER APU
  - (e) P34 External Power Panel
    - 1) 34B16, APU PWR GND SVCE BUS

S 862-009

- (5) AIRPLANES WITH TRANSFORMER RECTIFIER UNIT;  
Make sure these circuit breakers are closed:
- (a) P49 Auxiliary Panel
    - 1) TRU FAN
  - (b) P32 Right Generator Panel
    - 1) TRU APU START

S 862-016

- (6) Set the switches:
- (a) Set the main battery switch on the P5 overhead panel to ON.

EFFECTIVITY

ALL

49-11-00



- (b) If the warning horn comes on when you turn the battery switch to ON, do these steps:

NOTE: The horn comes on because the main battery bus is on without AC power.

- 1) Open the EQUIP COOL OVHT/SMOKE circuit breaker (11C20) on the P11 Overhead Panel.
- 2) When AC power is available, make sure you close the EQUIP COOL OVHT/SMOKE circuit breaker (11C20) on the P11 Overhead Panel.
- (c) Set the APU BLEED AIR VALVE switch on the P5 overhead panel to ON.

S 712-018

- (7) Do a test of the fire detection system for the APU:
  - (a) Push the ENG/APU/CARGO switch on the FIRE/OVHT TEST panel, which is on the P8 control stand panel.
  - (b) If AC power is available, make sure these messages show on EICAS:

NOTE: It is necessary to have AC power supplied to get the EICAS messages.

- 1) The APU FIRE message on the main EICAS display.
- 2) The APU FIRE LP1 message on the STATUS and MAINTENANCE displays.
- 3) The APU FIRE LP2 message on the STATUS and MAINTENANCE displays.
- (c) Make sure the fire alarms in the control cabin and on the P40 panel come on.

NOTE: The P40 panel is on the nose landing gear.

- (d) Make sure the light comes on for the APU switch on the P8 control stand panel.
- (e) Make sure the FIRE light on the captain's instrument panel, P1, comes on and is red.
- (f) Make sure the master warning lights on the P7 glare shield panel comes on.
- (g) Make sure all of the lights in the steps above go off.

NOTE: When all of the lights go off, the system operates correctly.

EFFECTIVITY

ALL

49-11-00

S 712-151

- (8) Do a test of the APU squib test circuit:
- (a) Push and hold the TEST 1 switch on the P61 squib test panel.
    - 1) Make sure the APU TEST light comes on.
  - (b) Release the TEST 1 switch.
    - 1) Make sure the APU TEST light goes off.

S 212-148

**WARNING:** DO NOT OPERATE ANY FUEL PUMP IF THE LOW PRESSURE LIGHT COMES ON AND STAYS ON. FUEL VAPORS IN THE TANK MAY IGNITE AND CAUSE A FIRE OR EXPLOSION.

- (9) Look at the fuel quantity indicator.

**NOTE:** The main fuel tank in the left wing must have 1000 pounds (454 kg) of fuel to operate the APU for one hour. After the first hour of APU operation, 500 pounds (227 kg) of fuel is necessary for each hour of APU operation.

- (a) If you must use the fuel boost pumps and the quantity of fuel is less than these limits, you must have a maintenance person or observer in the flight compartment to continuously monitor the LOW PRESSURE lights and the fuel quantity indicator.
- (b) If the quantity of fuel is more than these limits, do one of these two alternatives:
  - 1) It is permitted to not have a maintenance person or observer in the flight compartment if you calculate the time that you must go back to the flight compartment when the quantity of fuel is less than these limits.
  - 2) A maintenance person or observer is in the flight compartment to continuously monitor the LOW PRESSURE lights and fuel quantity indicator.
- (c) If the quantity of fuel is less than these limits and the LOW PRESSURE light comes on and stays on, shut down the APU.

S 862-073

- (10) Start and operate the APU:

EFFECTIVITY

ALL

49-11-00

02

Page 208  
Apr 22/04

**CAUTION:** AN UNDETECTED FIRE COULD OCCUR IN THE APU COMPARTMENT WITH THE APU ACCESS DOORS OPEN. THE APU FIRE DETECTION SYSTEM MAY NOT SENSE A SMALL FIRE AND MOST OF THE FIRE EXTINGUISHING AGENT WILL GO OUT FROM THE OPEN APU ACCESS DOORS. DAMAGE TO THE APU AND THE AIRPLANE CAN OCCUR.

- (a) Make sure there is an observer near the APU compartment to watch for a fire if the APU access doors are open during the APU operation.

**NOTE:** The observer should be in voice contact with aircraft personnel to report if a fire condition occurs. Aircraft personnel can do the APU fire switch, APU shutdown switch and emergency APU shutdown procedure and other corrective actions (include the use of fire extinguishers).

- (b) Set the APU control switch to the START position, hold the switch at the START position for one second and manually move the switch to the ON position.

**NOTE:** It is recommended that you do not release the APU control switch from the START position to the ON position. Damage to the internal contacts in the APU control switch can cause an APU no start problem.

- 1) Make sure the FAULT light comes on and goes off.

**NOTE:** The FAULT light comes on when the APU fuel valve opens.

- 2) Make sure the RUN and APU GEN OFF lights flash two times.

**NOTE:** The RUN and APU GEN OFF lights flash two times when the APU control unit (ECU) completes the BITE test.

- (c) If AC power is available, monitor the EGT and the RPM on the EICAS MAINTENANCE display.

**NOTE:** AC power must be supplied to get the EICAS indications.

- 1) Make sure the EGT increases at 7% rpm when the igniters energize.

EFFECTIVITY

ALL

49-11-00

07

Page 209  
Dec 22/08

- 2) Make sure the RUN light comes on when the APU is at 95% rpm.

NOTE: You can supply pneumatic and electrical loads when the APU is above 95% rpm.

- 3) If the APU acceleration times are not in the specified limits, the APU will have a shutdown and the APU FAULT light will come on.
- (d) If the APU does not start, do these steps:

CAUTION: MAKE SURE YOU OBEY THE STARTER DUTY CYCLE IN THE APU OPERATION LIMITS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, YOU CAN CAUSE DAMAGE TO THE APU.

- 1) Turn the APU control switch on the P5 panel to OFF.
- 2) Stop for 1 minute to let the fuel drain.
- 3) Set the APU control switch to the START position, hold the switch at the START position for one second and manually move the switch to the ON position.
- 4) If the APU does not start a third time, look for the APU BITE message on the EICAS MAINTENANCE display.
- 5) If the APU BITE message was on EICAS, do the APU Control Unit BITE procedure (AMM 49-61-05/201).

NOTE: If the APU has a shutdown a third time 15 seconds after it gets to 95% rpm, look for the LOP light during the BITE procedure.

NOTE: ECU WITH LOW OIL PRESSURE PROTECTION;  
The start will be prevented if there was low oil pressure after two starts.  
If the LOP light was on, make sure the LOP failure is corrected before you try to start the APU again.

TASK 49-11-00-802-074

#### 4. APU Shutdown Procedure

##### A. General

- (1) There are four different types of APU shutdowns. These shutdowns are as follows:
  - (a) A usual APU shutdown which uses the APU control switch.
  - (b) An emergency APU shutdown which uses the pilots fire switch on the P8 control stand panel.
  - (c) An emergency APU shutdown which uses the APU shutdown switch on the P40 panel on the nose landing gear.
  - (d) A protection shutdown which is done by the APU control unit.
- (2) This task gives the steps to do the first three types of shutdowns. The APU control unit automatically does the protection shutdown.

##### B. References

- (1) AMM 49-11-00/601, Auxiliary Power Unit

EFFECTIVITY

ALL

49-11-00

05

Page 210  
Apr 22/03

C. Access

(1) Location Zones

- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 711 Nose Landing Gear

D. Procedure

S 862-144

- (1) Do a usual APU shutdown with the APU control switch:
- (a) Turn the APU control switch on the P5 panel to OFF.
    - 1) If the APU has a pneumatic load, the shutdown will occur after 60 seconds.
    - 2) If the APU does not have a pneumatic load, the shutdown will occur immediately.
    - 3) When the APU is at 15% rpm, the inlet door closes and the fuel valve closes.

NOTE: The FAULT light will come on while the fuel valve closes.

S 862-113

CAUTION: USE THE EMERGENCY SHUTDOWN STEPS CAREFULLY. DO NOT TURN THE FIRE SWITCH UNLESS THERE IS A FIRE. IF YOU TURN THE FIRE SWITCH, THE FIRE BOTTLE(S) WILL RELEASE THEIR CONTENTS.

- (2) Do an emergency shutdown with the APU fire switch on the P8 control stand panel:
- (a) Pull the fire switch up to do the APU shutdown.
  - (b) If there is a fire, turn the fire switch to release the contents of the fire bottle(s).
  - (c) When the APU stops, turn the APU control switch on the P5 panel to OFF.
  - (d) Turn and push the fire switch to put the switch back to its usual position.
  - (e) Do this task: Inspection After an APU Fire (AMM 49-11-00/601).

S 862-024

- (3) Do an emergency shutdown with the APU autosutdown switch on the P40 panel which is on the nose landing gear:
- (a) Push the APU shutdown switch on the P40 panel to do the shutdown.

NOTE: The ARM light on the P40 panel will come on. This shows that the fire bottle(s) are prepared to release their contents.

- (b) If there is a fire, push the APU BOTTLE DISCHARGE switch on the P40 panel to release the contents of the fire bottle(s).

EFFECTIVITY

ALL

49-11-00

05

Page 211  
Apr 22/03

 **BOEING**  
767  
MAINTENANCE MANUAL

- (c) When the APU stops, turn the APU control switch on the P5 panel to OFF.
- (d) Set the main battery switch to OFF and then to ON.

NOTE: This will set the emergency shutdown system again.  
You can also open and close the APU FIRE EXT 1 circuit breaker (6G1) to set the system again.

- (e) Do this task: Inspection After an APU Fire (AMM 49-11-00/601).

EFFECTIVITY

ALL

49-11-00

05

Page 212  
Apr 22/03

TASK 49-11-00-802-025

5. Motor the APU

A. References

- (1) AMM 49-61-05/201, APU Control Unit

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 862-026

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 012-027

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

EFFECTIVITY

ALL

49-11-00

03

Page 213  
Apr 22/03

S 032-028

- (3) Disconnect the primary cable from the ignition unit (Fig. 202).

S 862-029

- (4) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11D34 FUEL DC PUMP PWR
    - 2) 11D35 FUEL DC PUMP CONT
  - (b) P6 Circuit Breaker Panel
    - 1) 6E3 FUEL VALVES APU
    - 2) 6G24 L FWD FUEL BOOST PUMP

S 862-032

- (5) Motor the APU:
- (a) Set the main battery switch on the P5 overhead panel to ON.
  - (b) Remove the DO-NOT-OPERATE tag from the APU control switch.

**CAUTION:** MAKE SURE YOU OBEY THE DUTY CYCLE FOR THE STARTER MOTOR. IF YOU DO NOT OBEY THE DUTY CYCLE, DAMAGE TO THE STARTER MOTOR CAN OCCUR.

- (c) Set the APU control switch to the START position, hold the switch at the START position for one second and manually move the switch to the ON position.

**NOTE:** It is recommended that you do not release the APU control switch from the START position to the ON position. Damage to the internal contacts in the APU control switch can cause an APU no start problem.

- (d) Motor the APU until the APU has a protection shutdown.

S 862-033

- (6) Set the APU control switch to OFF and attach a DO-NOT-OPERATE tag.

S 862-101

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P6 Circuit Breaker Panel
    - 1) 6E3, FUEL VALVES APU
    - 2) 6G24, L FWD FUEL BOOST PUMP
  - (b) P11 Overhead Panel
    - 1) 11D34, FUEL DC PUMP PWR

EFFECTIVITY

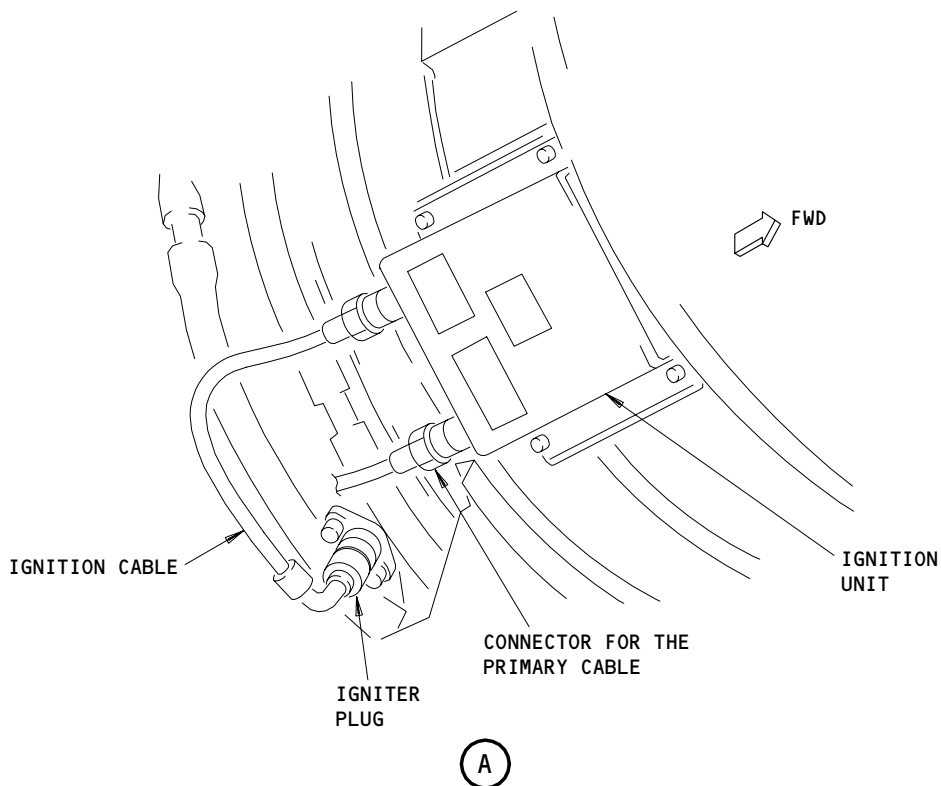
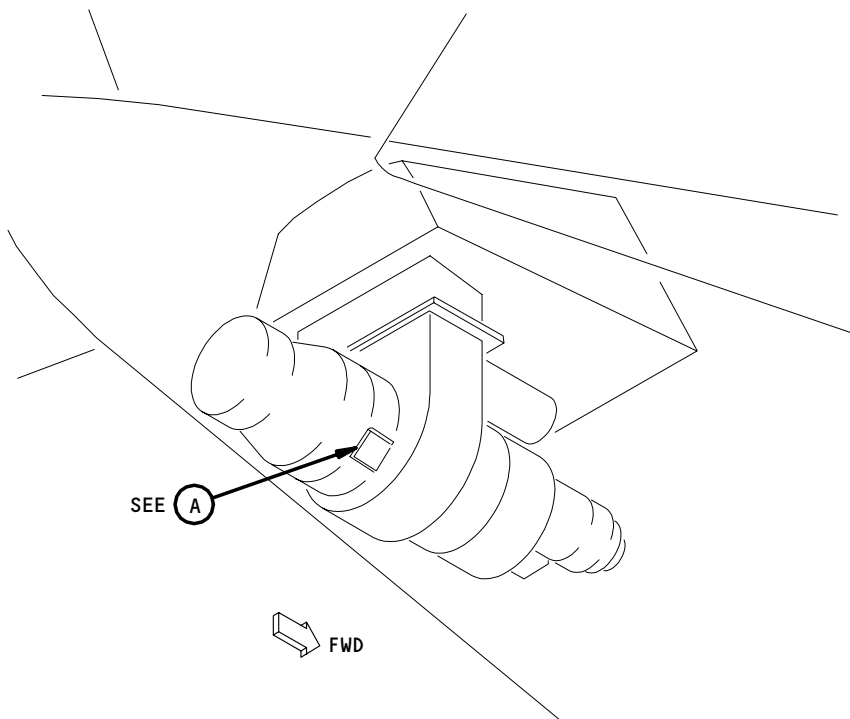
ALL

49-11-00

02

Page 214  
Apr 22/03





APU Motoring - Ignition Unit Primary Lead Connection  
Figure 202

EFFECTIVITY	
	ALL

49-11-00

03

Page 215  
Apr 22/03

2) 11D35, FUEL DC PUMP CONT

S 432-034

- (8) Connect the primary cable to the ignition unit (Fig. 202).

S 412-035

- (9) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 862-036

- (10) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 742-037

- (11) Erase the NO FLAME message from the memory of the APU control unit (AMM 49-61-05/201).

EFFECTIVITY

ALL

49-11-00

01

Page 216  
Apr 22/03

TASK 49-11-00-602-086

6. APU Preservation (Less Than 45 Days)

A. General

- (1) This task contains the steps that are necessary for the APU preservation less than 45 days.
- (2) Do the preservation task immediately when the APU will not be used. Continue the preservation until the APU goes to the engine shop.

B. Access

(1) Location Zones

154	Aft Cargo Compartment
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 862-039

- (1) Operate the APU:
  - (a) Start and operate the APU (Ref par. 3).
  - (b) Let the APU operate for a minimum of 5 minutes.
  - (c) Do a shutdown of the APU (Ref par. 4).

S 862-153

- (2) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 012-125

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

EFFECTIVITY

ALL

49-11-00

01

Page 217  
Dec 22/08

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 492-041

- (4) Install covers and plugs on these APU openings for protection (Fig. 203):
  - (a) The APU exhaust duct
  - (b) The APU compartment cooling and exhaust vent
  - (c) The exhaust vent for the APU oil cooler.

S 862-102

- (5) Replace the DO-NOT-OPERATE tag on the APU control switch on the P5 panel with a APU PRESERVATION tag.

S 412-124

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

TASK 49-11-00-602-121

7. APU Depreservation (Less Than 45 Days)

A. General

- (1) This task contains the steps to do the depreservation for the APU. These steps apply for an APU preservation for less than 45 days.

B. Access

(1) Location Zones

154	Aft Cargo Compartment
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

EFFECTIVITY

ALL

49-11-00

02

Page 218  
Dec 22/08

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

C. Procedure

S 862-122

- (1) Make sure the APU control switch on the P5 panel is OFF and replace the APU PRESERVATION tag with a DO-NOT-OPERATE tag.

S 012-123

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 082-127

- (3) Remove the covers or plugs from these openings (Fig. 203):

- (a) The APU exhaust duct
- (b) The APU compartment cooling and exhaust vent
- (c) The exhaust vent for the APU oil cooler.

EFFECTIVITY

ALL

49-11-00

03

Page 219  
Dec 22/08

S 412-128

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 862-129

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 962-130

- (6) Operate the APU:

(a) Do this task: APU Starting and Operation.

NOTE: It may be necessary to try to start the APU more than one time. The APU will not start until the preservation oil is out of the fuel system.

(b) Let the APU operate for a minimum of 5 minutes.

(c) Do this task: APU Shutdown Procedure.

TASK 49-11-00-602-085

8. APU Preservation (45 to 180 Days)

A. General

(1) This task contains the steps to do an APU preservation for 45 to 180 days.

(2) Do the APU preservation immediately when the APU will not be used. Continue the preservation until the APU goes to the engine shop.

B. Standard Tools and Equipment

(1) Service Cart - 10-25 psig, to supply preservation oil at a minimum temperature of 60°F (16°C) or

(2) PF55451 or PF53361 Cart - Service, Preservation Engine Oil Use Only, 15 Gallon Capacity (PF55451) or Two Gallon Capacity (PF53361)  
Malabar International (Vendor Code 94861)

220 W. Los Angeles Avenue, P.O. Box 367, Simi Valley, CA 93065  
(alternative equipment)

(3) Drain Hose - to connect the primary fuel manifold to the container

(4) Container - 5 U.S. Gallon (20 Liter) capacity, for fuel

(5) Container - 2 U.S. Gallon (8 Liter) capacity, for oil

EFFECTIVITY

ALL

49-11-00

02

Page 220  
Dec 22/08

C. Consumable Materials

- (1) B00075 Solvent - P-D-680, Stoddard Type 1
- (2) D00096 Oil - Jet Engine, Lubricating, MIL-PRF-6081, Grade 1005 or
- (3) D00124 Oil - Jet Engine, Lubricating, MIL-PRF-6081, Grade 1010

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 862-075

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 012-076

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 622-043

- (3) Do the fuel system preservation (Fig. 203):

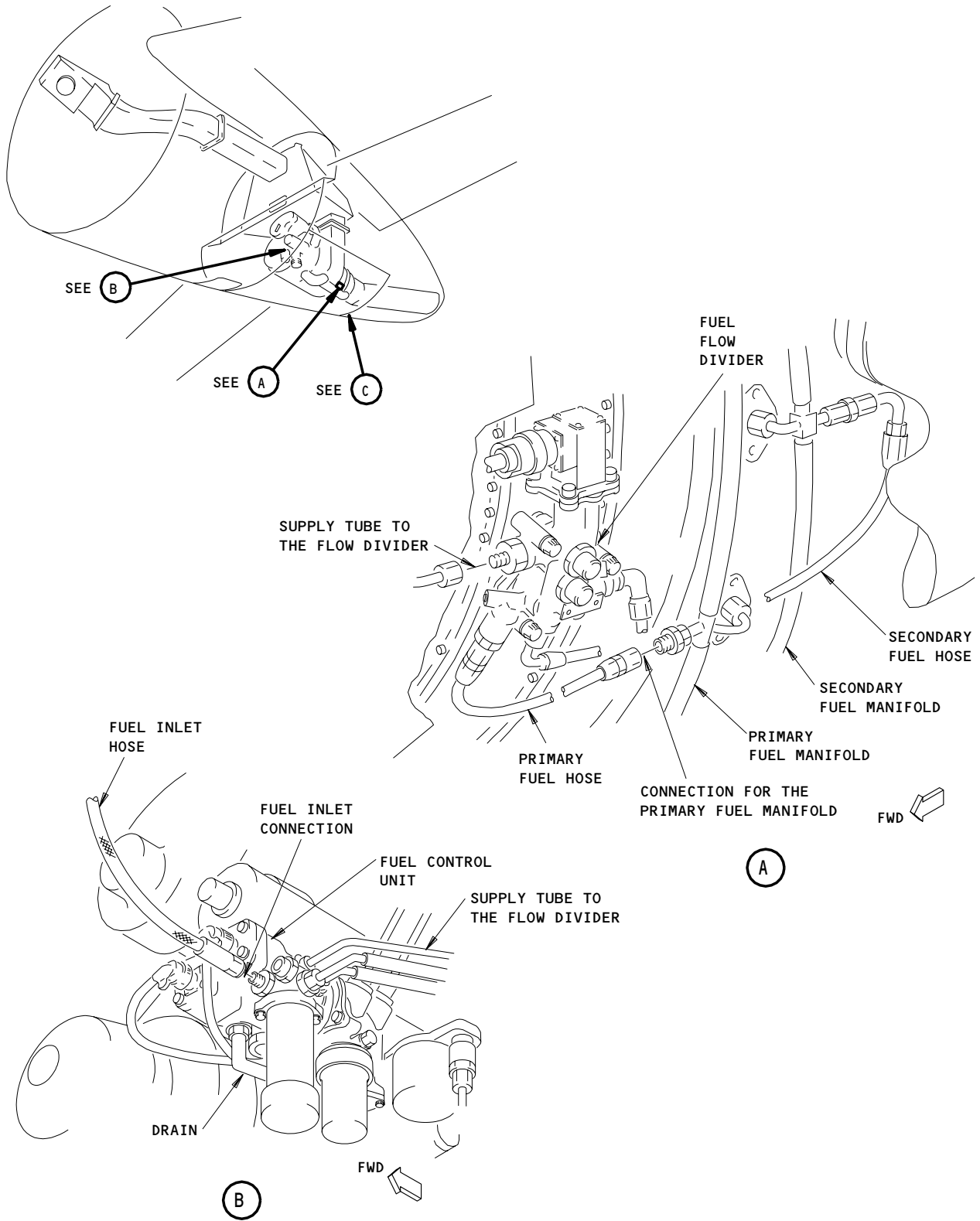
EFFECTIVITY

ALL

49-11-00

05

Page 221  
Apr 22/03

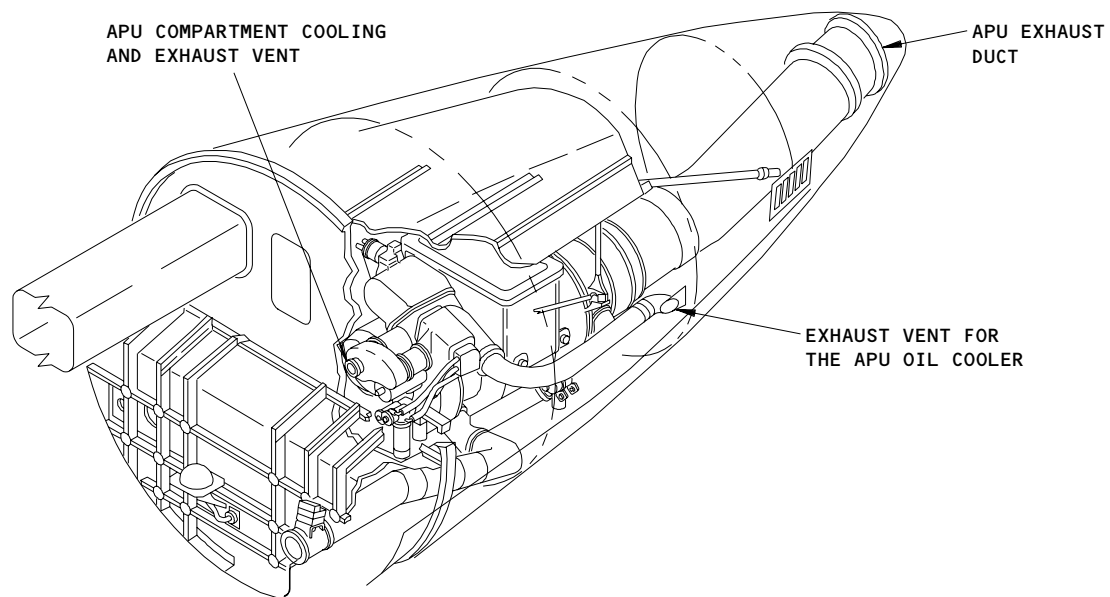


APU Preservation and Depreservation  
Figure 203 (Sheet 1)

EFFECTIVITY	
ALL	

49-11-00





COOLING AIR AND EXHAUST COVERS

(C)

APU Preservation and Depreservation  
Figure 203 (Sheet 2)

EFFECTIVITY	
	ALL

49-11-00

01

Page 223  
Dec 10/98

H84801

 **BOEING**  
767  
MAINTENANCE MANUAL

- (a) Put the container below the fuel control unit.
- (b) Disconnect the fuel inlet hose from the fuel control unit.
  - 1) Let the fuel fully drain from the fuel inlet hose and the fuel control unit.
- (c) Put the container below the fuel flow divider.
- (d) Disconnect the fuel supply tube from the fuel flow divider.
  - 1) Let the fuel fully drain from the fuel tube and the fuel flow divider.
- (e) Put the container below the primary fuel manifold.
- (f) Disconnect the fuel hose from the connector on the primary fuel manifold.
  - 1) Let the fuel fully drain from the fuel hose and the fuel manifold.

**CAUTION:** DO NOT USE HYDROCARBON MATERIALS OR OIL IN THE COMPRESSOR SECTION. THESE MATERIALS CAN BURN AND CAUSE DAMAGE TO THE APU.

- (g) Connect the oil service cart to the fuel inlet connection on the fuel control unit.

**NOTE:** It is not necessary to use a corrosion prevention oil in the lubrication system. The APU oil has satisfactory corrosion prevention.

- (h) Connect the fuel supply to the fuel flow divider.
- (i) Use the oil cart to supply the preservation oil to the fuel system at a light pressure (10–25 psig).
- (j) Motor the APU (Ref par. 5) until the oil comes out the fuel hose for the primary fuel manifold.

**NOTE:** If it is necessary, motor the APU again after the protection shutdown until the oil comes out the fuel hose.

- (k) Disconnect the oil service cart from the fuel inlet connection on the fuel control unit.
- (l) Connect the fuel hose to the primary fuel manifold.
  - 1) Tighten the fuel hose to 100–120 inch-pounds (11.3–13.6 newton-meters).
- (m) Install plugs and caps on all the external ports, fittings, and other openings on the APU.

**NOTE:** Make sure caps are installed on the fuel inlet port and the fuel and the oil drain fittings.

EFFECTIVITY

ALL

49-11-00

02

Page 224  
Apr 22/04

S 112-149

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THE SOLVENT IS A POISONOUS AND FLAMMABLE MATERIAL WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (4) Remove all the unwanted fuel and oil from the APU with the solvent.

S 622-081

- (5) Attach a warning tag to the APU to show that you did the APU preservation task.

S 492-083

- (6) Install covers or plugs on these APU openings (Fig. 203):
- (a) The APU exhaust duct
  - (b) The APU compartment cooling and exhaust vent
  - (c) The exhaust vent for the APU oil cooler.

S 412-131

- (7) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 862-084

- (8) Replace the DO-NOT-OPERATE tag on the APU control switch on the P5 panel with an APU preservation tag.

TASK 49-11-00-602-138

9. APU Depreservation (45 to 180 days)

A. General

- (1) This task contains the steps to do the depreservation for the APU. These steps apply for an APU preservation for 45 to 180 days.

EFFECTIVITY

ALL

49-11-00

03

Page 225  
Dec 22/08

B. Access

(1) Location Zones

154	Aft Cargo Compartment
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 862-139

- (1) Make sure the APU control switch on the P5 panel is OFF and replace the APU PRESERVATION tag with a DO-NOT-OPERATE tag.

S 012-140

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 082-133

- (3) Remove the covers or plugs from these openings (Fig. 203):

- (a) The APU exhaust duct  
(b) The APU compartment cooling and exhaust vent  
(c) The exhaust vent for the APU oil cooler.

EFFECTIVITY

ALL

49-11-00

03

Page 226  
Dec 22/08

- S 082-134  
(4) Remove the covers and the caps from all the APU fittings and ports.

- S 422-141  
(5) Connect the fuel inlet hose to the fuel control unit (Fig. 203).

- S 412-135  
(6) Close the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.  
(c) Lift the left access door until the two APU access doors are approximately aligned.  
(d) Close the two APU access doors.  
(e) Close the four latches on the right access door.

- S 862-136  
(7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

- S 862-137  
(8) Operate the APU:  
(a) Do this task: APU Starting and Operation.

NOTE: It may be necessary to try to start the APU more than one time. The APU will not start until the preservation oil is out of the fuel system.

- (b) Let the APU operate for a minimum of 5 minutes.  
(c) Do this task: APU Shutdown Procedure.

TASK 49-11-00-602-087

10. APU Preservation (More Than 180 Days)

A. General

- (1) This task contains the steps to do an APU preservation for more than 180 days.  
(2) Do the APU preservation immediately when the APU will not be used. Continue the preservation until the APU goes to the engine shop.

B. Standard Tools and Equipment

- (1) Service Cart - 10-25 psig, to supply preservation oil at a minimum temperature of 60°F (16°C) or

EFFECTIVITY

ALL

49-11-00

01

Page 227  
Dec 22/08

 **BOEING**  
767  
MAINTENANCE MANUAL

- (2) PF55451 or PF53361 Cart - Service, Preservation Engine Oil Use Only, 15 Gallon Capacity (PF55451) or Two Gallon Capacity (PF53361)  
Malabar International (Vendor Code 94861)  
220 W. Los Angeles Avenue, P.O. Box 367, Simi Valley, CA 93065  
(alternative equipment)
  - (3) Drain Hose - to connect the primary fuel manifold to the container
  - (4) Container - 5 U.S. Gallon (20 Liter) capacity, for fuel
  - (5) Container - 2 U.S. Gallon (8 Liter) capacity, for oil
- C. Consumable Materials
- (1) B00075 Solvent - P-D-680, Stoddard Type 1
  - (2) D00096 Oil - Jet Engine, Lubricating, MIL-L-6081, Grade 1005 or
  - (3) D00124 Oil - Jet Engine, Lubricating, MIL-PRF-6081, Grade 1010
  - (4) G00626 Desiccant - Dehumidifier, MIL-D-3464
  - (5) G01004 Indicator - Humidity, MS20003
  - (6) G02081 Material - Barrier, MIL-B-131
- D. References
- (1) AMM 49-11-01/401, Auxiliary Power Unit
- E. Access
- (1) Location Zones
    - 154 Aft Cargo Compartment
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right
    - 822 Aft Cargo Door
- F. Procedure
- S 862-088
- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
- S 012-089
- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:
    - (a) While you hold the left access door in the closed position, open the four latches on the right access door.
- NOTE:** The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

EFFECTIVITY

ALL

49-11-00

02

Page 228  
Dec 22/05

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 622-090

- (3) Do the fuel system preservation:

- (a) Put the container below the fuel control unit.
- (b) Disconnect the fuel inlet hose from the fuel control unit.
  - 1) Let the fuel fully drain from the fuel inlet hose and the fuel control unit.
- (c) Put the container below the fuel flow divider.
- (d) Disconnect the fuel supply tube from the fuel flow divider.
  - 1) Let the fuel fully drain from the fuel tube and the fuel flow divider.
- (e) Put the container below the primary fuel manifold.
- (f) Disconnect the fuel hose from the connector on the primary fuel manifold.
  - 1) Let the fuel fully drain from the fuel hose and the fuel manifold.

CAUTION: DO NOT USE HYDROCARBON MATERIALS OR OIL IN THE COMPRESSOR SECTION. THESE MATERIALS CAN BURN AND CAUSE DAMAGE TO THE APU.

- (g) Connect the oil service cart to the fuel inlet connection on the fuel control unit.

NOTE: It is not necessary to use a corrosion prevention oil in the lubrication system. The APU oil has satisfactory corrosion prevention.

- (h) Connect the fuel supply to the fuel flow divider.
- (i) Use the service cart to supply the preservation oil to the fuel system at a light pressure (10-25 psig).

EFFECTIVITY

ALL

49-11-00

01

Page 229  
Dec 22/04

 **BOEING**  
767  
MAINTENANCE MANUAL

- (j) Motor the APU until the oil comes out the fuel hose for the primary fuel manifold (Ref par. 5).

NOTE: If it is necessary, motor the APU again after the protection shutdown until the oil comes out the fuel hose.

- (k) Disconnect the oil service cart from the fuel inlet connection on the fuel control unit.
- (l) Connect the fuel hose to the primary fuel manifold.  
1) Tighten the fuel hose to 100–120 inch-pounds (11.3–13.6 newton-meters).
- (m) Install plugs and caps on all the external ports, fittings, and other openings on the APU.

NOTE: Make sure caps are installed on the fuel inlet port and the fuel and the oil drain fittings.

S 112-150

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THE SOLVENT IS A POISONOUS AND FLAMMABLE MATERIAL WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (4) Remove all the unwanted fuel and oil from the APU with the solvent.

S 622-095

- (5) Attach a warning tag to the APU to show that you did the APU preservation.

S 022-047

- (6) Remove the APU (AMM 49-11-01/401).

EFFECTIVITY

ALL

49-11-00

01

Page 230  
Dec 22/04



S 492-105

- (7) Install covers or plugs on these openings (Fig. 203):
- The APU exhaust duct
  - The APU compartment cooling and exhaust vent
  - The exhaust vent for the APU oil cooler.

S 862-103

- (8) Replace the DO-NOT-OPERATE tag on the APU control switch on the P5 panel with an APU preservation tag.

S 552-048

- (9) Prepare the APU for storage:
- Put the APU in a moisture proof bag with the desiccant and a humidity indicator.
  - Put the APU in a storage container.
  - Make sure you put the APU in a location with a humidity of 40% or less and a temperature between 4°C (40°F) and 48°C (120°F).
  - Make sure the APU is in a clean location with no fumes that can cause corrosion.
  - Make sure the APU does not get damaged.

S 212-049

- (10) Examine the humidity indicator in the storage container each 30 days.
- Compare the color of the humidity indicator with the chart that came with the indicator.
  - If the humidity in the storage container is less than 40%, the APU is sufficiently dry.
  - If the humidity is more than 40%, examine the APU:
    - Remove the APU from the bag.
    - Examine the APU internally for corrosion.
    - If the APU has corrosion in it, send the APU to the engine shop.
    - If you do not find corrosion, do the preservation steps again.

TASK 49-11-00-602-096

11. APU Depreservation (More than 180 Days)

A. General

- (1) This task contains the steps to do the depreservation for the APU. These steps apply for an APU preservation for more than 180 days.

B. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit

EFFECTIVITY

ALL

49-11-00

01

Page 231  
Dec 22/08

C. Access

(1) Location Zones

154	Aft Cargo Compartment
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

D. Procedure

S 862-050

- (1) Make sure the APU control switch on the P5 panel is OFF and replace the APU PRESERVATION tag with a DO-NOT-OPERATE tag.

S 012-051

- (2) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 632-052

- (3) Do the APU depreservation:

- (a) Remove the covers or plugs from these openings (Fig. 203):
- 1) The APU exhaust duct
  - 2) The APU compartment cooling and exhaust vent
  - 3) The exhaust vent for the APU oil cooler.

EFFECTIVITY

ALL

49-11-00

04

Page 232  
Dec 22/08

- (b) Install the APU:
  - 1) Remove the APU from the storage container.
  - 2) Remove the desiccant and the humidity indicators from the APU.
  - 3) Install the APU (AMM 49-11-01/401).
- (c) Remove the covers and the caps from all the APU fittings and ports.

S 412-098

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 862-104

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 862-099

- (6) Operate the APU:
  - (a) Do this task: APU Starting and Operation.

NOTE: It may be necessary to try to start the APU more than one time. The APU will not start until the preservation oil is out of the fuel system.

- (b) Let the APU operate for a minimum of 5 minutes.
- (c) Do this task: APU Shutdown Procedure.

EFFECTIVITY

ALL

49-11-00

04

Page 233  
Dec 22/08

AUXILIARY POWER UNIT – ADJUSTMENT/TEST

1. General

- A. There are two tasks in this procedure. The first task (the APU – Adjustment/Test) is a test of the control unit (ECU), the oil system, and the fuel manifold of the APU. The second task is a test of the emergency shutdown system for the APU.
- B. It is not necessary to make adjustments to the APU or to the APU control unit when the APU is installed on the airplane. But, you can use this procedure to do a check of the APU systems with the APU installed on the airplane.

TASK 49-11-00-725-001

2. Auxiliary Power Unit (APU) – Adjustment/Test

A. Equipment

- (1) Fuel Manifold Tester – 833563-6 (recommended),  
289544-6 (optional)  
Supplied by Garrett Turbine Engine,  
ATTN: Ground Support Equipment, Dept. 66,  
P.O. Box 29003, Phoenix, Arizona 85038.

B. Consumable Materials

- (1) G00018 Nitrogen, Gaseous – BB-N-411, Type 1, Class 1, Grade A

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-16-00/601, APU Drains and Vents
- (3) AMM 49-27-04/601, Magnetic Chip Detectors and Drain Plug
- (4) AMM 49-31-06/401, Fuel Manifolds and Nozzles
- (5) AMM 49-61-05/201, APU Control Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

E. APU Control Unit (ECU) Check

S 745-002

- (1) Do this task: APU Control Unit – BITE procedure (AMM 49-61-05/201).

EFFECTIVITY

ALL

49-11-00

01

Page 501  
Dec 22/05

F. APU Oil Inspection

S 225-003

- (1) Use a spectrographic oil analysis program (SOAP) to examine the APU oil.

**NOTE:** The SOAP is the recommended procedure to examine the APU oil. This procedure finds the quantity of metal (parts per million) that is chemically bonded or mixed with the oil. Metal particles do not have an effect on this procedure.

S 215-004

- (2) Do this task: Magnetic Chip Detectors Inspection (AMM 49-27-04/601).

G. Fuel Manifold Test (Fig. 501)

S 865-005

- (1) Prepare for the fuel manifold test
  - (a) Put the APU control switch in the OFF position and attach a DO-NOT-OPERATE tag.
  - (b) Open these circuit breakers and attach DO-NOT-CLOSE tags:
    - 1) P11 Overhead Panel
      - a) 11B35, APU ALTN CONT
    - 2) P49 APU Auxiliary Panel
      - a) 49C2, APU PRIME CONT
      - b) 49C3, APU START
  - (c) Open the left APU access door, 315AL, and right APU access door, 316AR:
    - 1) While you hold the left access door in the closed position, open the four latches on the right access door.

**NOTE:** The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- 2) Open the left access door to the fully open position and manually lock the hold-open strut.

**NOTE:** You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- 3) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

**NOTE:** The location of the detent latch is at the forward end of the right access door.

- 4) Open the right access door to the fully open position and manually lock the hold-open strut.

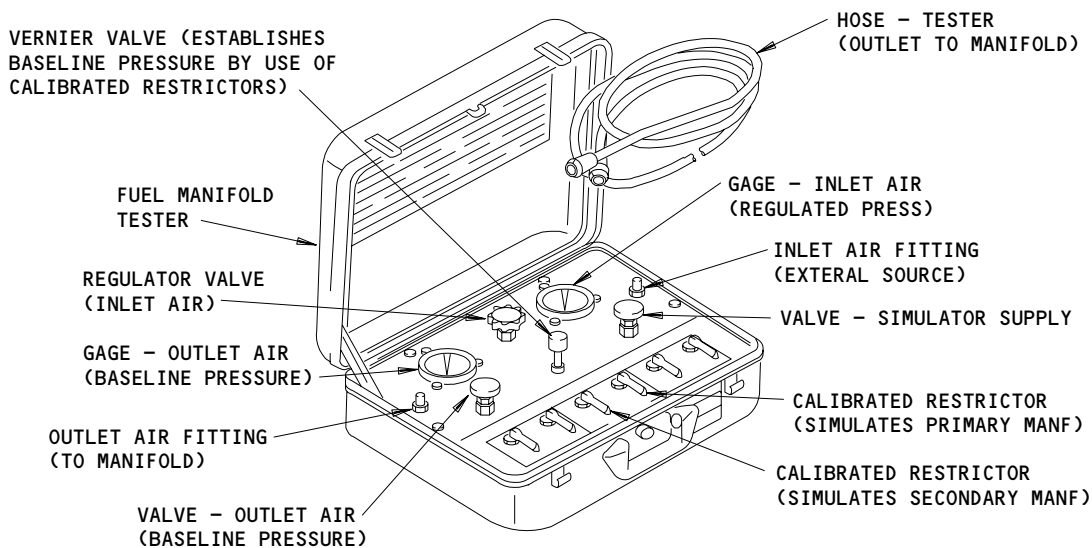
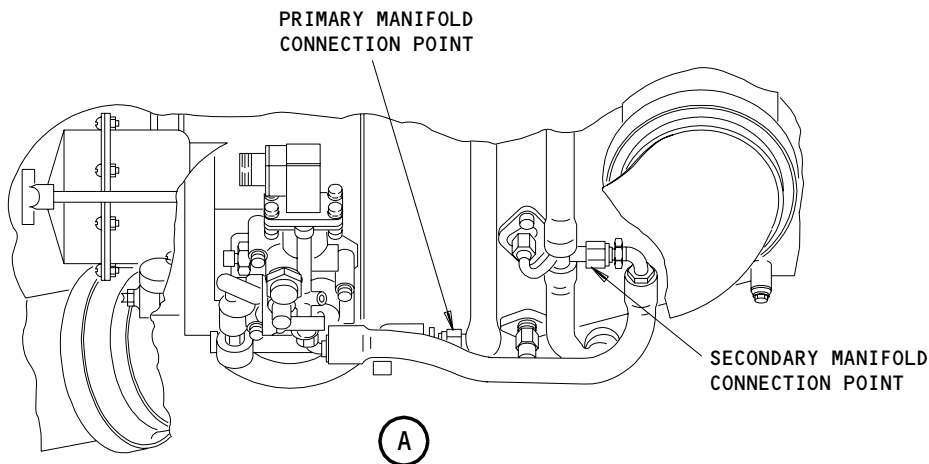
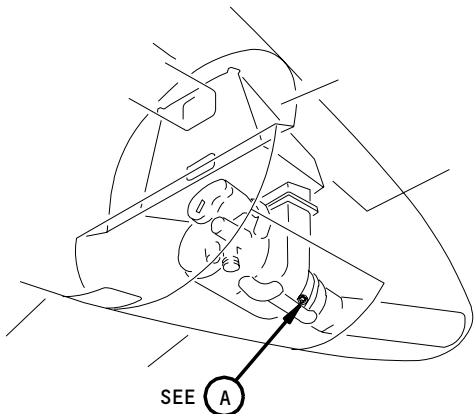
EFFECTIVITY

ALL

49-11-00

03

Page 502  
Aug 22/01



Fuel Manifold Test  
Figure 501

EFFECTIVITY	
	ALL

49-11-00

S 485-006

- (2) Do these steps to install the fuel manifold tester:
- Make sure all of the valves and restrictors on the tester are fully closed.
  - Connect a nitrogen bottle (or a filtered air source with a pressure of 160-170 psig) and a pressure regulator to the INLET AIR connector on the tester.
  - Disconnect the fuel supply hoses from the primary and the secondary manifolds at the connection points (Fig. 501).
  - Connect the tester hose to the OUTLET AIR connection on the tester.

S 785-007

- (3) Do the fuel manifold test as follows:

**NOTE:** This test is done for one manifold first. When that part of the test is completed, do the test again for the other manifold.

- Connect the free end of the tester hose to one of the manifold assemblies (primary or secondary).
- Adjust the REGULATOR VALVE on the source to show 150.0 +1/-1 psig on the INLET PRESSURE gage.
- Open the SIMULATOR SUPPLY valve and the CALIBRATED RESTRICTOR valve (primary or secondary for the manifold that is examined).

**NOTE:** This permits you to adjust the air pressure for the fuel nozzles that are new. You then supply this pressure to the manifolds as the base pressure. The base pressure can be compared to the outlet pressure to the manifolds to find the condition of the manifolds.

- Adjust the VERNIER VALVE to show 100.0 psig on the OUTPUT PRESSURE gage.
- Close the CALIBRATED RESTRICTOR (primary or secondary) valve and the SIMULATOR valve.
- Open the OUTLET AIR valve to supply a base pressure of 100.0 psig to the manifold assembly.
- Make a record of the data that follows:
  - Manifold assembly
  - The pressure on the OUTLET PRESSURE gage.
- Close the OUTLET AIR valve.
- Make sure the fuel manifold is in the limits below.
- Do the test again for the other fuel manifold (primary or secondary).

EFFECTIVITY

ALL

49-11-00

01

Page 504  
Apr 22/99

S 435-008

- (4) Connect the fuel supply hoses to the primary and secondary manifold assemblies.
- (a) Tighten the fuel supply hoses to 100-120 inch-pounds (11.3-13.5 newton meters).

S 785-009

- (5) The limits for the fuel manifold test are in the table that follows:

**NOTE:** For each 10.0 psig of pressure more than the base pressure (100.0 psig), one fuel nozzle has a blockage.

Pressure (psig)	Limit
131 and more	Fuel nozzles have a blockage. Replace the nozzles (Ref 49-31-00).
111 to 130	Fuel nozzles can have a blockage. Monitor the fuel system and do this procedure again after 500 hours.
100 to 110	The fuel manifold assembly is satisfactory.
99 and less	Examine for leaks or for a wrong fuel nozzle in the manifold assembly.

S 865-010

- (6) Put the airplane back to its usual condition
- (a) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- 1) P49 APU Auxiliary Panel
    - a) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

**49-11-00**

03

Page 505  
Aug 22/01



- b) 49C3, APU START
- 2) P11 Overhead Panel
  - a) 11B35, APU ALTN CONT
- (b) Remove the DO-NOT-OPERATE tag from the APU control switch on the overhead panel, P5.

S 865-011

- (7) Do this task: APU Starting and Operation (AMM 49-11-00/201).

S 795-012

- (8) Examine the APU for leakage.

S 865-013

- (9) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 415-014

- (10) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

TASK 49-11-00-715-015

3. APU Emergency Shutdown System - Adjustment/Test

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

B. Access

(1) Location Zones

- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 710 Nose Landing Gear

- C. Do a Test of the APU shutdown switch on the APU shutdown panel, P40

S 865-018

- (1) Do this task: APU Starting and Operation (AMM 49-11-00/201).

EFFECTIVITY

ALL

49-11-00

02

Page 506  
Aug 22/01

S 715-032

**CAUTION:** DO NOT PUSH THE APU BOTTLE DISCHARGE SWITCH AFTER YOU PUSH THE APU SHUTDOWN SWITCH. THE APU SHUTDOWN SWITCH ARMS THE FIRE BOTTLES. IF YOU PUSH THE APU BOTTLE DISCHARGE SWITCH WHEN THE FIRE BOTTLES ARE ARMED, THE FIRE BOTTLES WILL RELEASE THEIR CONTENTS.

- (2) Push the APU SHUTDOWN switch on the landing gear panel, P40, and hold for a minimum of 5 seconds.
  - (a) Do not push the APU BOTTLE DISCHARGE switch or the fire bottle will release its contents.
  - (b) Make sure the FIRE BOTTLE ARMED light on the P40 panel comes on.
  - (c) Make sure the APU stops.

S 865-020

- (3) After the shutdown, put the APU control switch on the overhead panel, P5, to the OFF position.

S 865-023

- (4) Put the BAT switch on the overhead panel, P5, to the OFF position and then to the ON position.

**NOTE:** This will set the emergency shutdown system again to make sure the system can operate.

- D. Do a test of the APU fire switch on the aft pilot's control panel, P8

S 865-025

**CAUTION:** OPEN THESE CIRCUIT BREAKERS ON THE P6 PANEL. IF YOU DO NOT OPEN THESE CIRCUIT BREAKERS, THE FIRE BOTTLE CAN RELEASE ITS CONTENTS.

- (1) Open these circuit breakers on the main power distribution panel, P6, and attach DO-NOT-CLOSE tags:
  - (a) 6G1, APU FIRE EXT 1

EFFECTIVITY

ALL

49-11-00

03

Page 507  
Aug 22/01

- (b) AIRPLANES WITH DUAL FIRE BOTTLES;  
6G2, APU FIRE EXT 2

S 865-026

- (2) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).

S 715-027

**CAUTION:** DO NOT TURN THE FIRE SWITCH. IF YOU TURN THE FIRE SWITCH, THE FIRE BOTTLE WILL RELEASE ITS CONTENTS.

- (3) Pull the APU fire switch straight out.
  - (a) Do not turn the fire switch.
  - (b) Make sure the APU stops.

S 865-028

- (4) After the shutdown, put the APU control switch to the OFF position.

S 865-030

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P6 panel:
  - (a) 6G1, APU FIRE EXT 1
  - (b) AIRPLANES WITH DUAL FIRE BOTTLES;  
6G2, APU FIRE EXT 2

S 715-033

- (6) Set the APU fire switch back to its original position.

EFFECTIVITY

ALL

49-11-00

04

Page 508  
Apr 22/09

AUXILIARY POWER UNIT - INSPECTION/CHECK

1. General

A. This procedure has the task to inspect the APU after an APU fire.

TASK 49-11-00-206-013

2. Inspection After an APU Fire

A. References

(1) AMM 49-11-01/401, Auxiliary Power Unit

B. Equipment

(1) Vacuum - Source, 24 inch Hg minimum

C. Consumable Materials

(1) G00034 Cloth, Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)  
- BMS15-5

(2) G02439 Brush, Nylon Bristle

(3) G00110 Sponge, Silicone Rubber, Closed-Cell, General Purpose,  
Non-Solvent Use - BMS1-23

(4) G50140 Gloves, Protective - Latex or Nitrile

(5) B01023 Cleaner, Primary - Ardrex 6025

D. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

E. Prepare for the Inspection

S 866-002

(1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-003

(2) Open these circuit breakers and attach DO-NOT-CLOSE tags:

(a) P11 Overhead Panel

1) 11B35, APU ALTN CONT

(b) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

EFFECTIVITY

ALL

49-11-00

03

Page 601  
Apr 22/03

S 016-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

F. Procedure

S 216-014

- (1) Visually examine the APU for the cause of the APU fire or an APU that became too hot.

(a) If you find external damage to the APU, replace the APU (AMM 49-11-01/401).

(b) If you do not find external damage to the APU, refer to the fault isolation manual for the APU fire detection system to find the cause of the high temperature indication.

S 216-015

- (2) Do these steps to visually examine the APU compartment and its structural components for signs of fire damage:

(a) Visually examine the APU compartment and its structural components for signs of fire damage.

(b) Visually examine the three APU mounts for signs of fire damage.

EFFECTIVITY

ALL

49-11-00

01

Page 602  
Apr 22/03

- (c) If you find signs of fire damage in the APU compartment and its structural components, contact Boeing Service Engineering for the disposition of the APU and APU compartment due to a fire condition.

**NOTE:** An APU fire will affect the safety and structural components integrity of the airplane. Boeing engineering and structural repair personnel will review airline operator-supplied information and provide recommendations on a case-by-case basis.

S 116-016

- (3) Do these steps to remove and/or clean the fire extinguishing agent used for the APU fire from the external surfaces of the APU and APU compartment:

- (a) Do these steps if foam was the fire extinguishing agent:

**CAUTION:** DO NOT LET THE FOAM GO IN THE HOLES ON THE APU. FOAM THAT STAYS IN THE APU CAN CAUSE CORROSION OF THE ENGINE INTERNAL COMPONENTS.

- 1) Clean the areas of the APU and APU compartment where the foam was used with clean water, cleaning cloth, brush, sponge, gloves or other equivalent equipment.
- 2) Make sure you remove all signs of the foam from the APU and APU compartment.

- (b) Do these steps if dry chemical powder was the fire extinguishing agent:

**CAUTION:** DO NOT USE WATER TO REMOVE THE DRY CHEMICAL POWDER FROM THE APU. THE DRY AGENTS IN THE CHEMICAL POWDER, WHEN YOU MIX WITH WATER, WILL MAKE A COMPOUND THAT CAN CAUSE CORROSION. DO NOT LET THE DRY CHEMICAL POWDER GO IN THE HOLES ON THE APU. DRY CHEMICAL POWDER THAT STAY IN THE APU CAN CAUSE CORROSION OF THE ENGINE INTERNAL COMPONENTS.

- 1) Clean the areas of the APU and APU compartment where the dry chemical powder was used with a vacuum or other equivalent equipment to remove the powder.
- 2) If the dry chemical powder was changed to a glaze-like formation due to high temperatures, clean the areas with the cleaner, cleaning cloth, brush, sponge, gloves or other equivalent equipment.

EFFECTIVITY

ALL

49-11-00

01

Page 603  
Apr 22/04

- 3) Make sure you remove all signs of the dry chemical powder from the APU and APU compartment.
- (c) Do these steps if halogen or halon was the fire extinguishing agent:
  - 1) In-flight use of the fire extinguishing system is permitted with no special cleaning procedure.

**WARNING:** DO NOT BREATHE THE GAS FROM THE FIRE EXTINGUISHING AGENT IN THE APU COMPARTMENT AFTER IT IS USED. DO NOT LET THE FIRE EXTINGUISHING AGENT TOUCH YOUR SKIN. YOU MUST HAVE A GOOD FLOW OF AIR AT THE LOCATION WHERE THE AGENT WAS USED. IF YOU DO NOT OBEY THESE PRECAUTIONS, INJURY TO PERSONS AND DAMAGE TO EQUIPMENT CAN OCCUR.

- 2) Ground use of the fire extinguishing system is permitted but make sure the two APU access doors are opened for a minimum of 30 minutes to remove all halogen or halon gases. No special cleaning procedure is necessary.
- 3) If it is necessary, clean the external surfaces of the APU from the power section to the turbine exhaust port with clean water, cleaning cloth, brush, sponge, gloves or other equivalent equipment.

G. Put the Airplane Back to Its Usual Condition

S 866-009

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 866-010

- (2) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 416-012

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

EFFECTIVITY

ALL

49-11-00

03

Page 604  
Apr 22/03

 **BOEING**  
767  
MAINTENANCE MANUAL

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

**49-11-00**

01

Page 605  
Apr 22/03



AUXILIARY POWER UNIT – REMOVAL/INSTALLATION

1. General

- A. There are four tasks in this procedure. The first task is to remove the APU with the two fishpole hoists. The second task is to install the APU with the two fishpole hoists. The third task is to remove the APU with the hydraulic jack. The fourth task is to install the APU with the hydraulic jack.
- B. There are two procedures available for the removal and installation of the APU. Each procedure is optional to the other. The procedure that is used is determined by the ground equipment that is available.
  - (1) Fishpole hoist procedure:
    - (a) This procedure uses two fishpole hoists to lower and lift the APU.
  - (2) Hydraulic jack procedure:
    - (a) This procedure uses a hydraulic jack and a height adjustable stand to lower and lift the APU.

TASK 49-11-01-004-001

2. APU Removal (Fishpole Hoist Procedure) (Fig. 401, Fig. 402, Fig. 403, Fig. 404)

A. References

- (1) AMM 21-00-21/201, Air Conditioning System Oil Smoke/Fume Contamination (Removal)
- (2) AMM 36-11-01/701, Pneumatic Duct

B. Special Tools and Equipment

- (1) APU Cradle Hoist Equip - A49001-78 or A49001-84
- (2) APU Cradle Ballast - A49001-3 or A49001-17
- (3) APU Transportation Dolly - A49003-1 or A49003-12
- (4) APU Support Equip (includes support retainers, thread protectors, and exhaust duct support saddle) - A49004-1
- (5) One set of these fishpole hoists is required:
  - (a) PF51-011 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (b) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or
  - (c) AP6108 Hoist - Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

C. Standard Tools and Equipment

- (1) Container - 1.5 U.S. Gallon (5.7 Liter) capacity, for fuel

EFFECTIVITY

ALL

49-11-01

01

Page 401  
Aug 22/05

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Prepare for the APU Removal

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:

- (a) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT
- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-006

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

EFFECTIVITY

ALL

49-11-01

08

Page 402  
Aug 22/04

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

F. APU Removal

S 034-093

- (1) Remove the electrical connections from the generator (Fig. 401).
  - (a) Remove the terminal block cover (17) from the generator.
  - (b) Remove the terminal nuts (18) and the washers (14), or the lock nut as applicable.
  - (c) Remove the four power leads and identify for installation.
  - (d) Install the terminal nuts (18) and the washers (14), or the lock nut on the terminal studs.
  - (e) Install the terminal block cover (17) with the washers (15) and the screws (16).

S 034-007

- (2) Disconnect the APU harness, generator cables, and the starter motor cables from the supports on the APU.

S 034-091

- (3) Disconnect the APU harness and starter motor cables at the firewall (Fig. 401).

**NOTE:** The starter motor cables can be disconnected at the starter motor or at the firewall.

S 034-010

- (4) Remove the nuts (9) and washers (8) to disconnect the bonding jumper (7) from the fuselage (Fig. 401).

S 034-011

- (5) Disconnect the generator control connector from the generator (Fig. 401).

S 034-013

- (6) Remove the clamps (1), flex ducts (2, 4), and discharge duct (3).

S 034-014

- (7) Loosen the clamps (6) on the air supply duct (5) at the left side of the APU (Fig. 401).
  - (a) Disengage the clamps (6) from the flange on the air supply duct (5).
  - (b) Remove the air supply duct (5).

S 034-015

- (8) Put caps on all of the openings of the air supply and oil-cooler-discharge ducts.

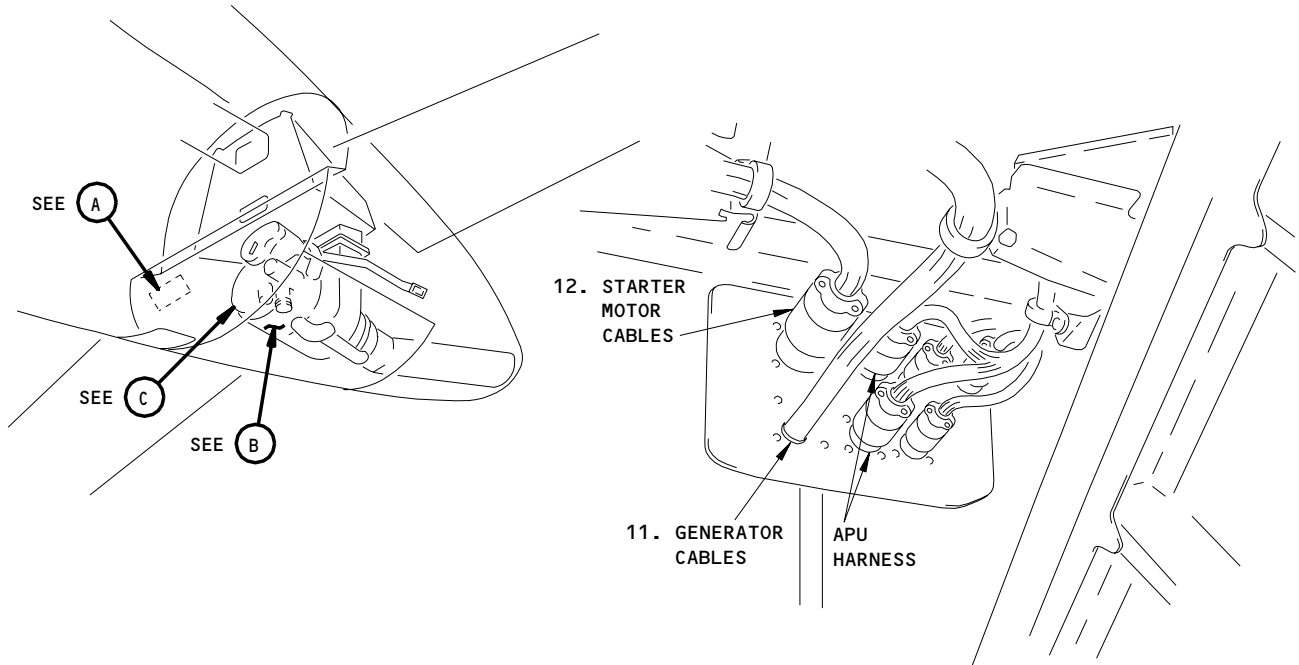
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ALL

49-11-01

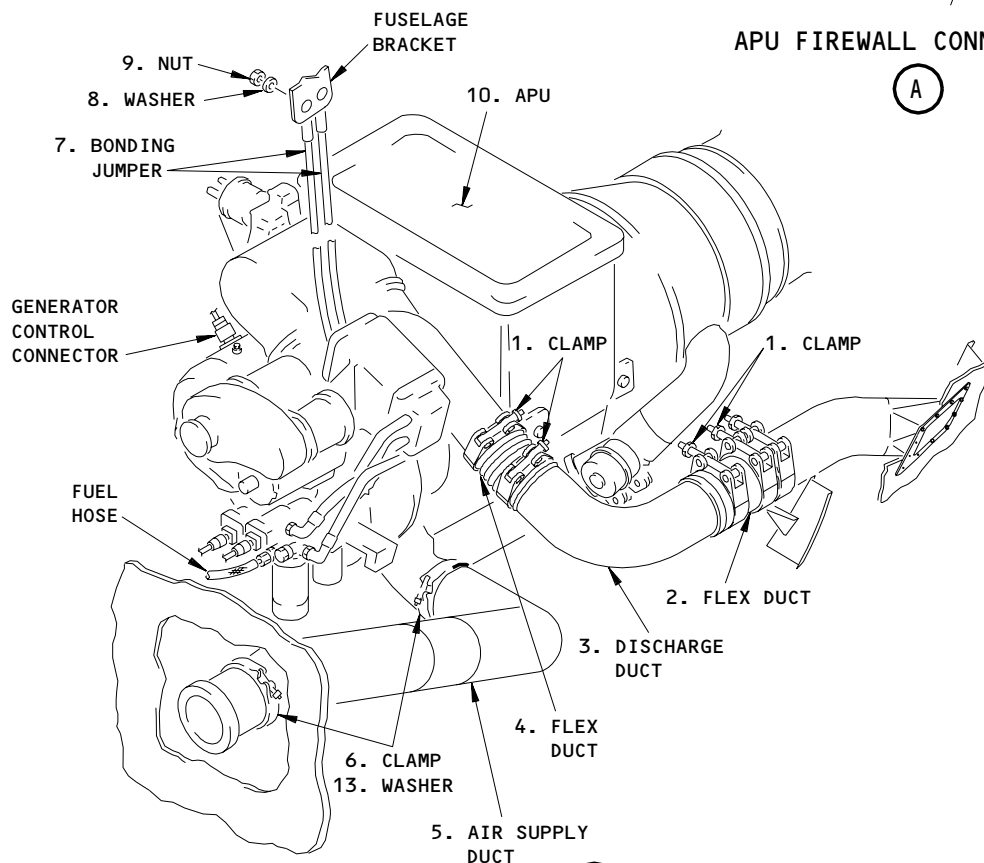
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Page 403  
Aug 22/05



APU FIREWALL CONNECTIONS

(A)



(B)

APU System Connections  
Figure 401 (Sheet 1)

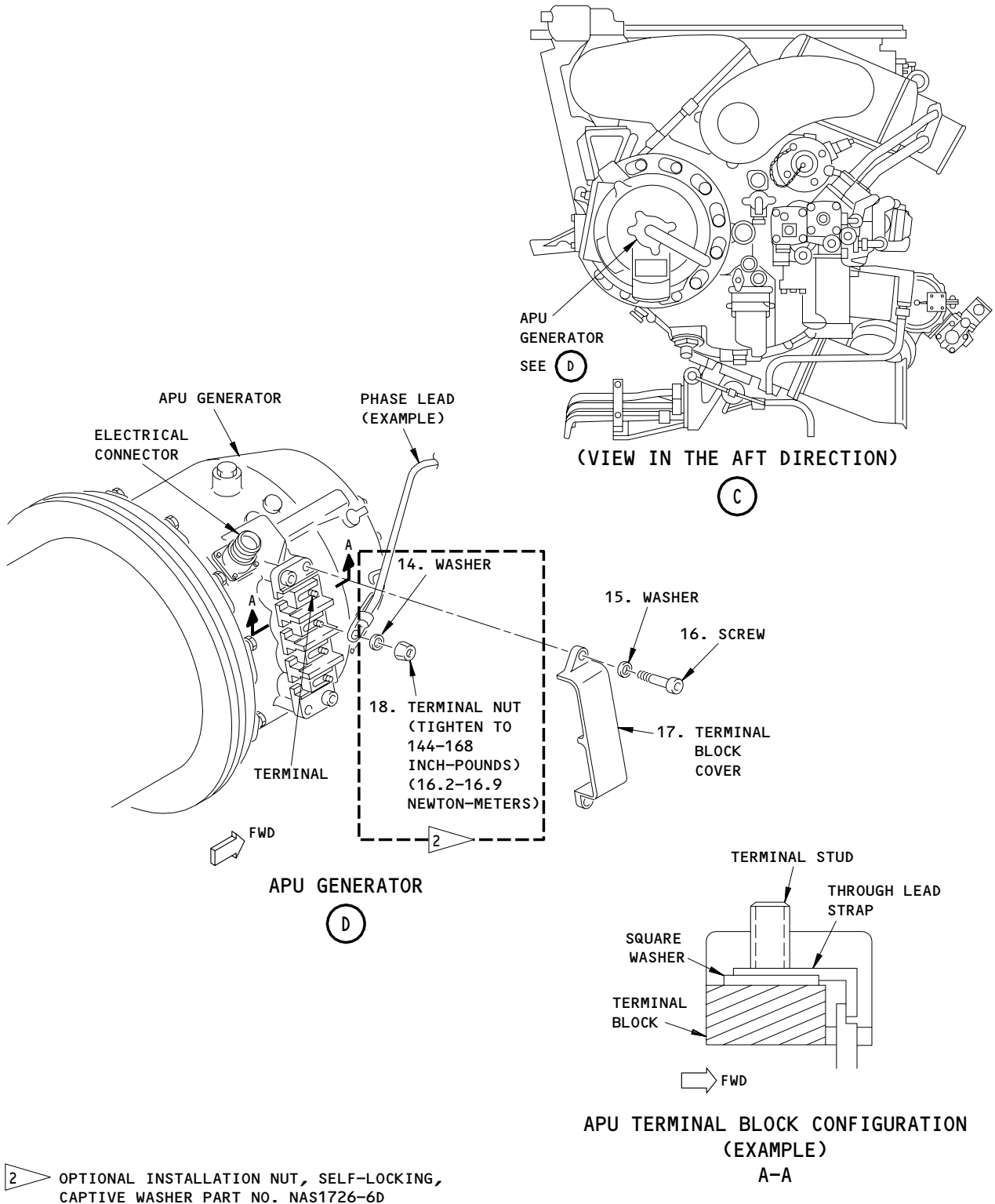
EFFECTIVITY

ALL

49-11-01

06

Page 404  
Aug 10/95



APU System Connections  
Figure 401 (Sheet 2)

EFFECTIVITY	ALL
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49-11-01

S 494-016

- (9) Install the exhaust duct support saddle and tighten the buckles (Fig. 402).

S 034-017

- (10) Loosen the V-band clamp and slide the exhaust duct aft (Fig. 402).

S 494-082

- (11) Put the container below the fuel control unit.

S 034-018

- (12) Disconnect the fuel hose at the fuel control unit (Fig. 401).  
(a) Let the fuel drain from the fuel hose.  
(b) Put caps on the openings of the fuel hose and the fuel control unit.

S 484-225

**WARNING:** MAKE SURE THE TWO FISHPOLE HOISTS ARE IN A SERVICEABLE CONDITION. THE TWO CABLES OR CHAINS OF THE TWO FISHPOLE HOISTS MUST SHOW NO SIGNS OF DAMAGE. YOU CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

**CAUTION:** FISHPOLE HOISTS WITH A CABLE AND DRUM ASSEMBLY; MAKE SURE THE TWO CABLES OF THE TWO FISHPOLE HOISTS ARE EQUALLY WOUND AROUND THE DRUM ASSEMBLY BEFORE YOU USE THE TWO FISHPOLE HOISTS TO HOLD THE APU.

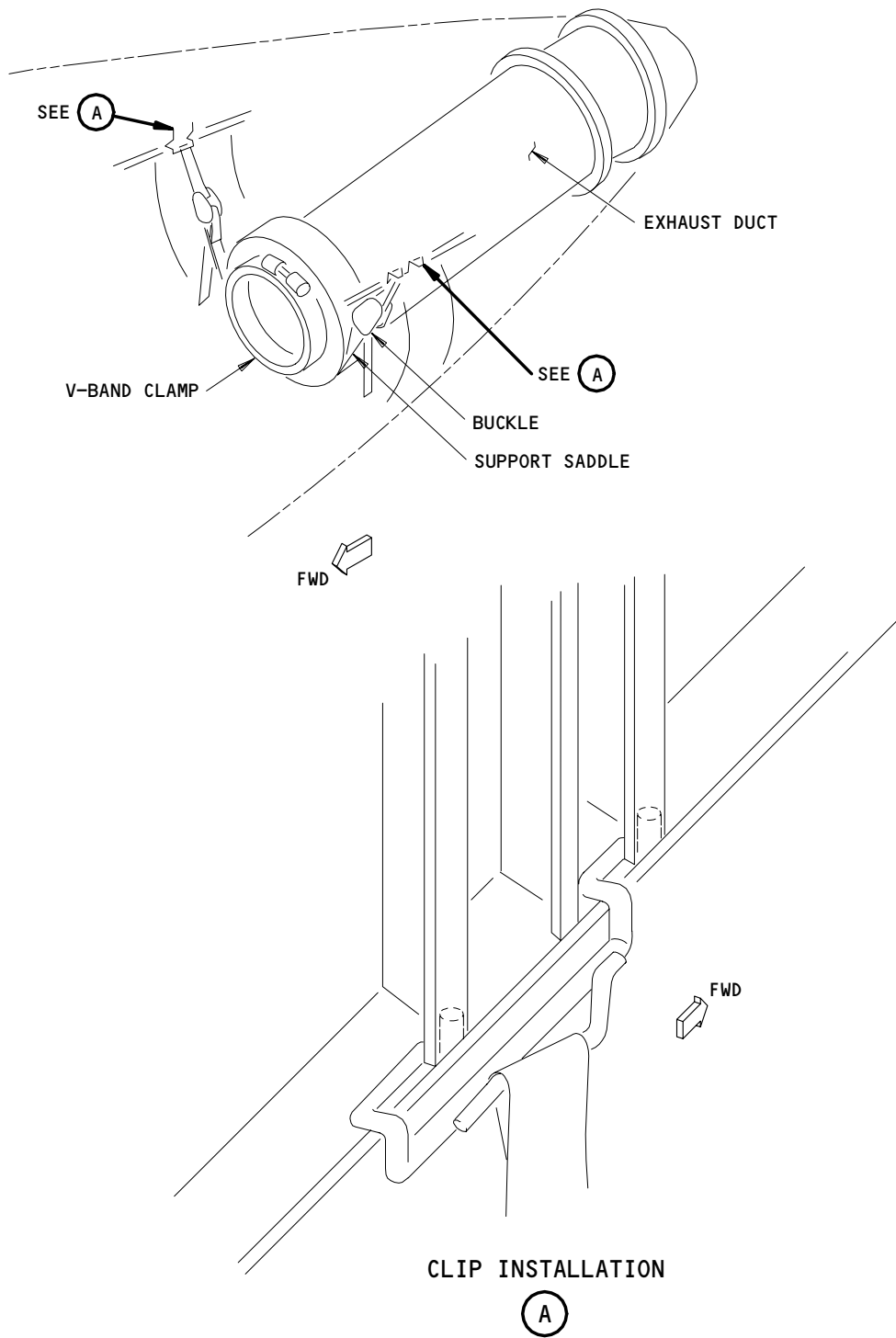
- (13) Install the two fishpole hoists (Fig. 403):  
(a) Install the hoist beam from the bracket on the plenum to the fuselage (Fig. 403).

**NOTE:** The hoist beam is part of the hoist equipment.

EFFECTIVITY

ALL

49-11-01



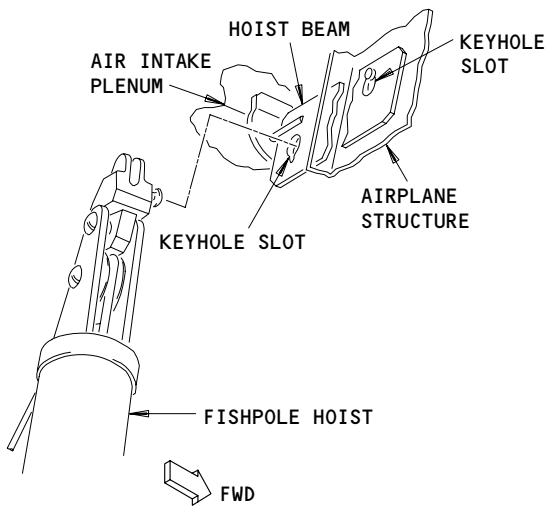
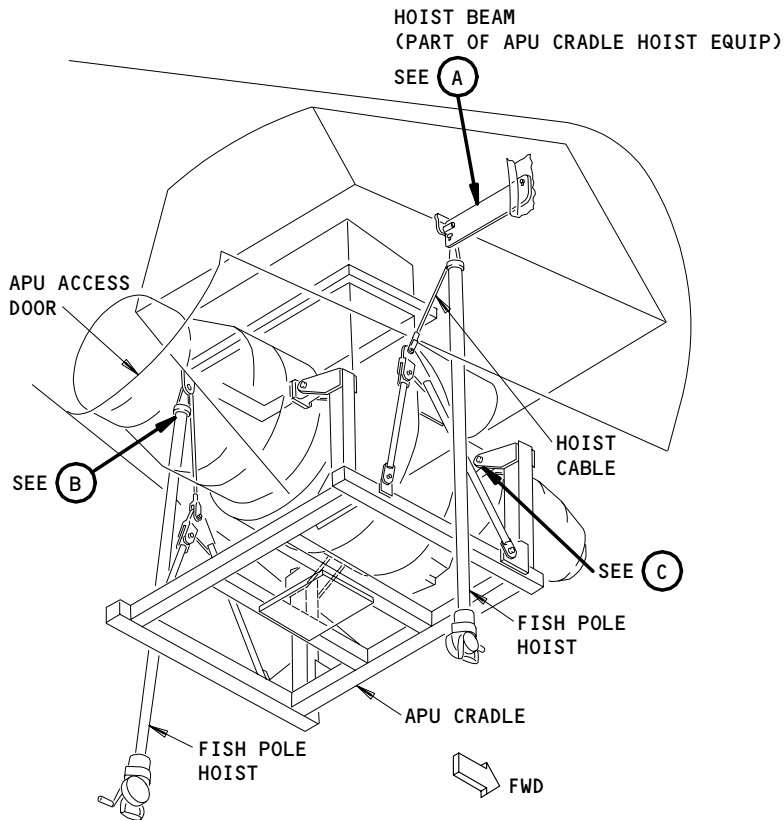
APU Exhaust Duct Support Saddle - Installation  
Figure 402

EFFECTIVITY	
	ALL

49-11-01

05

Page 407  
Aug 10/95



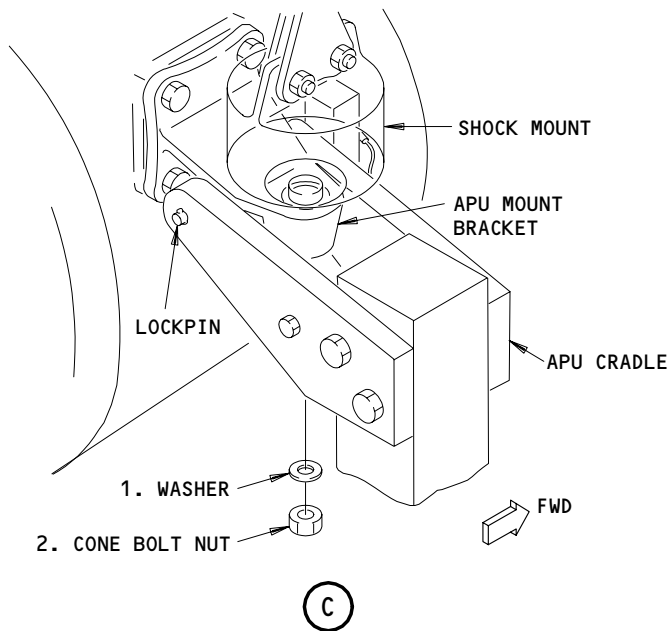
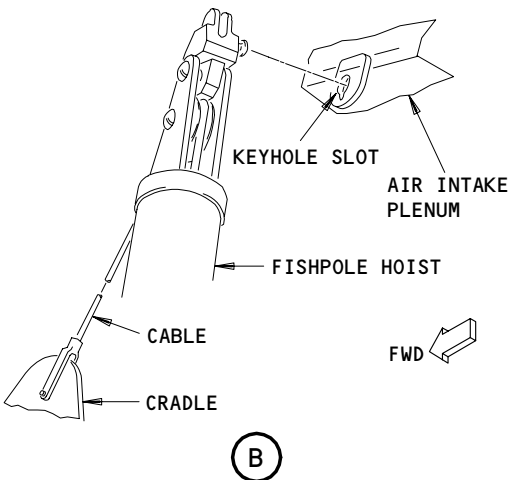
(A)

Fishpole Hoist and Cradle Installation  
Figure 403 (Sheet 1)

EFFECTIVITY	
ALL	

49-11-01





Fishpole Hoist and Cradle Installation  
Figure 403 (Sheet 2)

EFFECTIVITY

ALL

49-11-01

02

Page 409  
Aug 10/95

 **BOEING**  
767  
MAINTENANCE MANUAL

- (b) Examine the keyhole slot area for any damage before you install the fishpole hoist.
- (c) Install the fishpole hoists in the keyhole slot on plenum (left side) and in the hoist beam (right side) (Fig. 403).
- (d) Make sure the fishpole hoists are correctly installed.

**NOTE:** If the fishpole hoists do not correctly install in the keyhole slots, refer to the Service Letter 49-12 and the SB 49-18.

- (e) Extend the fishpole hoists to a length that is easy to use.
- (f) Install the cradle on the APU (Fig. 403):
  - 1) Extend the fishpole hoist cables or chains and attach the cables or chains to the cradle on the ground.
  - 2) Lift the cradle to the APU.
  - 3) Align the cradle on the APU and attach the lockpins.

**WARNING:** INSTALL THE BALLAST ON THE CRADLE IF THE GENERATOR IS REMOVED. WITHOUT THE GENERATOR, THE APU IS NOT BALANCED AND CAN CAUSE DAMAGE TO EQUIPMENT OR INJURY TO PERSONS.

- 4) Install the ballast on the cradle if the generator is removed (Fig. 404).
- (g) Tighten the hoist cables a sufficient amount to take the weight off of the APU mounts (Fig. 403).

**NOTE:** The weight of an APU with oil in it and the support equipment is approximately 700 pounds (320 kg).

S 034-027

- (14) Remove the cone bolt nuts (2) and washers (1) from the forward and aft mounts (Fig. 403).

**NOTE:** Use an open end wrench on the shaft flats between the mount bracket and the shockmount. This holds the shaft while you remove the cone bolt nuts.

S 024-028

- (15) Lower the APU (10) until the mount brackets are free of the cone bolts.

S 494-029

- (16) Move the aft shockmounts on the right side outboard and install the retainer on the supports (Fig. 404).

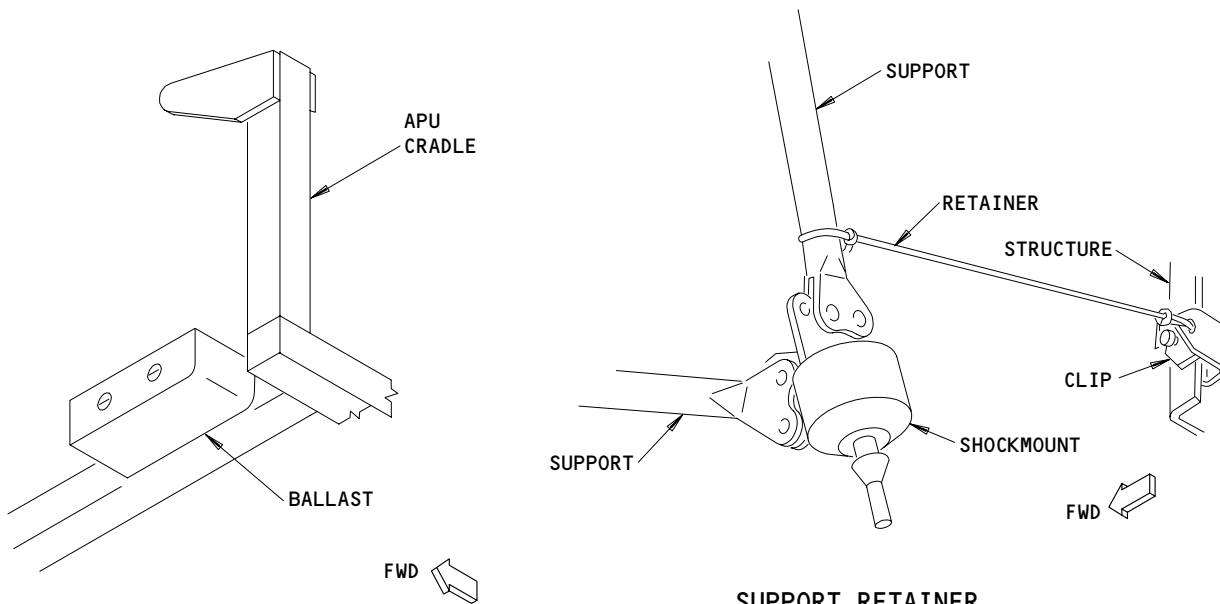
S 494-114

- (17) Lower the APU (10) onto the APU dolly (Fig. 404):

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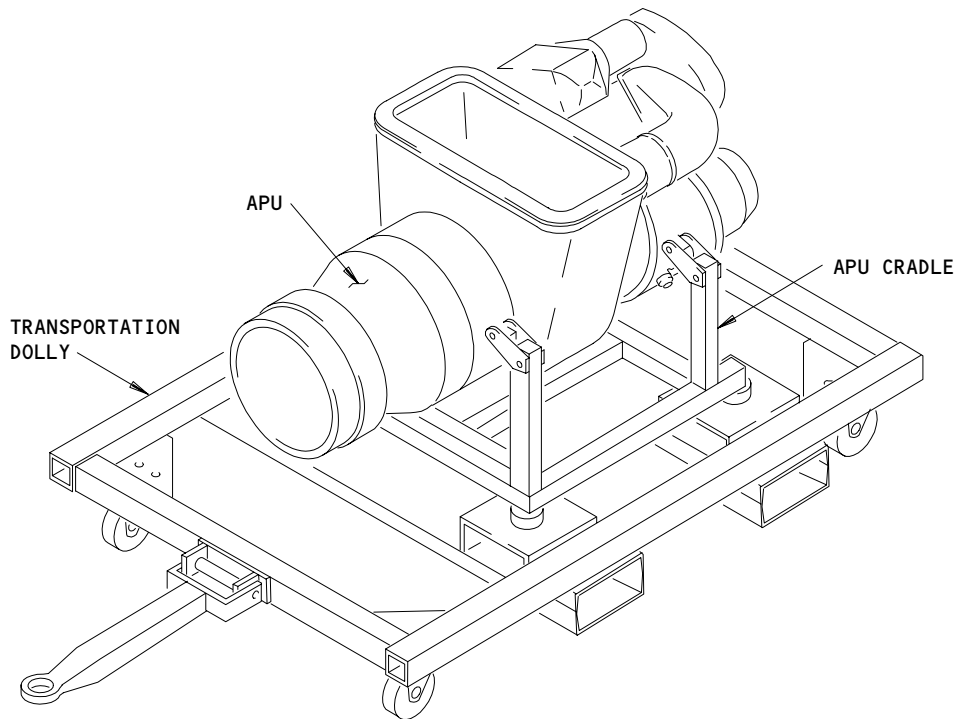
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49-11-01



APU CRADLE BALLAST

SUPPORT RETAINER



APU TRANSPORTATION DOLLY

APU Installation  
Figure 404

EFFECTIVITY	
	ALL

49-11-01

02

Page 411  
Aug 10/95

23180

S 094-115

- (18) Disconnect the fishpole hoist cables from the cradle.  
(a) If you do not install a new APU immediately, remove the fishpole hoists from the airplane.

S 214-241

- (19) Visually examine the air supply duct (5) for signs of oil and other contamination.  
(a) If you find signs of oil and other contamination, then do these tasks:  
1) Clean the air supply duct (5). To clean it, do this task: Cleaning the Bare Titanium Ducts (AMM 36-11-01/701).  
2) Remove the oil contamination from the air conditioning and pneumatic systems. To remove it, do this task: Removal of Oil Contamination from the Air Conditioning and Pneumatic Systems (AMM 21-00-21/201).

TASK 49-11-01-404-095

3. APU Installation (Fishpole Hoist Procedure) (Fig. 401, Fig. 402, Fig. 403, Fig. 404)

**NOTE:** If you install a new APU, install the bonding jumper (7) and the starter motor cables (12) with the APU on the ground. Also, do the APU - Servicing procedure (AMM 12-13-04/301) before you install the APU.

A. Equipment

- (1) APU Cradle Hoist Equip - A49001-78 or A49001-84  
(2) APU Cradle Ballast - A49001-3 or A49001-17  
(3) APU Transportation Dolly - A49003-1 or A49003-12  
(4) APU Support Equip (includes support retainers, thread protectors, and exhaust duct support saddle) - A49004-1  
(5) One set of these fishpole hoists is required:  
(a) PF51-011 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or  
(b) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or  
(c) AP6108 Hoist - Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

EFFECTIVITY

ALL

49-11-01

01

Page 412  
Aug 22/05

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	10	Auxiliary Power Unit	49-11-00	01	80, 81 or 82

C. References

- (1) AMM 12-13-04/301, Servicing (Oil Fill)
- (2) AMM 24-21-01/401, APU Generator
- (3) AMM 49-11-00/201, Auxiliary Power Unit
- (4) AMM 49-13-00/601, APU Mounts
- (5) AMM 49-61-05/201, APU Control Unit
- (6) AMM 49-94-04/401, Oil Quantity Transmitter

D. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 211 Flight Compartment - Left
  - 212 Flight Compartment - Right
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right
- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. APU Installation

- S 214-034
- (1) Before you install the APU, visually examine both the airplane and the APU mount assemblies for cracks, wear, or damage (AMM 49-13-00/601).
- S 434-080
- (2) If it is necessary, remove the covers from the APU inlet plenum and from the APU exhaust duct.
- S 214-220
- (3) Examine the APU inlet plenum and air inlet ducts for foreign objects, chips and cracks.

EFFECTIVITY

ALL

**49-11-01**

06

Page 413  
Aug 22/05

S 214-222

- (4) Do a check for the oil quantity transmitter on the new APU (AMM 49-94-04/401):

**NOTE:** The part number for the oil quantity transmitter is 8TJ99GGE1 (Boeing part number S351N101-1).

- (a) If the oil quantity transmitter is not installed, then do these steps to replace with an oil quantity transmitter:

**NOTE:** The low oil level switch can be installed on the new APU. It is necessary to replace it with an oil quantity transmitter.

- 1) Remove the low oil level switch from the new APU.
- 2) Do this task: Oil Quantity Transmitter Installation (AMM 49-94-04/401).

S 484-226

**WARNING:** MAKE SURE THE TWO FISHPOLE HOISTS ARE IN A SERVICEABLE CONDITION. THE TWO CABLES OR CHAINS OF THE TWO FISHPOLE HOISTS MUST SHOW NO SIGNS OF DAMAGE. YOU CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

**CAUTION:** FISHPOLE HOISTS WITH A CABLE AND DRUM ASSEMBLY; MAKE SURE THE TWO CABLES OF THE TWO FISHPOLE HOISTS ARE EQUALLY WOUND AROUND THE DRUM ASSEMBLY BEFORE YOU USE THE TWO FISHPOLE HOISTS TO HOLD THE APU.

- (5) Install the fishpole hoists (Fig. 403):
- (a) Examine the keyhole slot area for any damage before you install the fishpole hoist.
  - (b) Install the fishpole hoists in the keyhole slots (Fig. 403).
  - (c) Make sure the fishpole hoists are correctly installed.

**NOTE:** If the fishpole hoists do not correctly install in the keyhole slots, refer to the Service Letter 49-12 and the SB 49-18.

S 494-037

- (6) Align the APU and cradle below the APU compartment.

S 494-038

- (7) Attach the hoist cables to the cradle (Fig. 403).

EFFECTIVITY

ALL

49-11-01

S 494-039

**WARNING:** INSTALL THE BALLAST ON THE CRADLE IF THE GENERATOR IS REMOVED. WITHOUT THE GENERATOR, THE APU IS NOT BALANCED AND CAN CAUSE DAMAGE TO EQUIPMENT OR INJURY TO PERSONS.

- (8) Install the ballast on the cradle if the generator is removed.

S 424-044

- (9) Lift the APU with the fishpole hoists until the mount brackets are just below the cone bolts.

**NOTE:** The weight of an APU with oil and the support equipment is approximately 700 pounds (320 Kg).

S 094-045

- (10) Remove the support retainers from the support rods (Fig. 404).

S 824-101

**CAUTION:** MAKE SURE YOU OPERATE THE HOIST MANUALLY AND CAREFULLY LIFT THE APU SO YOU DO NOT DAMAGE THE CONE SURFACE ON THE MOUNT BRACKET.

- (11) If the hoist has a pneumatic motor, set the hoist to manual operation.

S 424-100

- (12) Lift the APU until the cone bolts are engaged.

S 094-047

- (13) Remove the thread protectors from the cone bolts.

S 434-048

- (14) Install new cone bolt washers (1) and nuts (2) or use washers and nuts that had a dye penetrant inspection (Fig. 403).

(a) Do the torque limit test for the three nuts (2):

- 1) Tighten the three nuts (2) to a run-on torque of not more than 100 inch-pounds (11.3 newton-meters) until you can see one to two full threads and the cone bolt chamfer extends below each nut.

**NOTE:** Use an open-end wrench on the shaft between the APU mounting bracket and the shockmount to hold the shaft.

- 2) Make sure the three washers (1) do not touch the bottom surface of the three APU mounting brackets.

EFFECTIVITY

ALL

49-11-01

- 3) Make sure the break-away torque necessary to turn the three nuts (2) from this position is more than 14 inch-pounds (1.6 newton-meters).
  - 4) Replace any nuts that do not meet the torque limits in the above steps.
- (b) Tighten the nuts completely to 475-525 inch-pounds (53.68-59.33 newton meters).

S 094-049

- (15) Remove the cradle from the APU (Fig. 403).
- (a) Remove the lockpins from the mount brackets.
  - (b) Lower the cradle to the ground.
  - (c) Remove the hoist cables from the cradle.

S 094-051

- (16) Remove the fishpole hoists and the hoist beam from the airplane (Fig. 403).

S 434-052

- (17) Attach the bonding jumper (7) to the fuselage with the washers (8) and nuts (9) (Fig. 401).

S 434-053

- (18) Remove the dust caps from all of the air ducts.

S 434-054

- (19) Install the air supply duct (5).
- (a) Tighten the clamps (6) to 50-70 inch-pounds (5.65-7.91 newton meters) (Fig. 401).

**NOTE:** If necessary, use a washer under the clamp nut to get the torque above.

S 434-055

**CAUTION:** MAKE SURE THE COOLING AIR DUCT IS ALIGNED CORRECTLY AND IS NOT DAMAGED. THE COOLING AIR DUCT MUST BE CORRECTLY INSTALLED OR THE OIL TEMPERATURE CAN NOT BE SUFFICIENTLY DECREASED.

- (20) Put the oil cooling air duct assembly (1, 2, 3, 4) in position (Fig. 401)
- (a) Make sure the clamps (1) are a minimum of 0.06 inches in from the edge of the flex duct (2).
  - (b) Tighten the clamps (1) to 10-20 inch-pounds (1.13-2.26 newton meters).

EFFECTIVITY

ALL

49-11-01



S 434-056

**CAUTION:** DO NOT TWIST THE FUEL TUBE OR YOU CAN CAUSE A BLOCKAGE AND THE APU CANNOT GET ENOUGH FUEL.

- (21) Remove the caps from the fuel hose and the fuel control unit (Fig. 401).

S 434-057

- (22) Install the fuel tube (Fig. 401).

S 434-058

- (23) Connect the generator control to the APU (Fig. 401).  
(a) Install a lockwire on the generator control.

S 434-079

- (24) Remove the caps from the electrical connectors and receptacles.

S 434-092

- (25) Connect the APU harness and starter motor cables at the firewall (Fig. 401).

**NOTE:** Connect the starter motor cables at the starter motor if necessary.

S 434-061

- (26) Install the harness fasteners on the supports and on the firewall.

S 434-094

- (27) If the generator is installed on the APU, connect the electrical connections.  
(a) Remove the terminal block cover (17) from the generator.  
(b) Make sure that the terminals on the APU generator are properly assembled. Square washers go under the through lead straps.

EFFECTIVITY

ALL

49-11-01

22.1

Page 417  
Aug 22/09

**CAUTION:** ENSURE MATCHING OF CONDUCTORS AND TERMINALS. INCORRECT INSTALLATION WILL RESULT IN CIRCUIT MALFUNCTION AND/OR DAMAGED EQUIPMENT.

**CAUTION:** INSTALL ROUND WASHERS BETWEEN TERMINAL NUT AND PHASE LEAD. DO NOT INSTALL ANY WASHERS BENEATH PHASE LEADS. TO DO SO WILL RESULT IN LOCALIZED RESISTANCE HEATING WHICH COULD CAUSE BURNING OF THE TERMINAL BLOCK.

- (c) Put the four leads on the generator terminal studs.
- (d) Install the washers (14) and the terminal nuts (18) or the lock nuts as applicable.
- (e) Tighten the terminal nuts to 144-168 inch-pounds (16.2-18.9 newton meters).

**CAUTION:** DO NOT APPLY RTV MATERIAL TO GENERATOR TERMINALS. USE OF RTV MATERIAL WILL MAKE TERMINAL BLOCK COVER DIFFICULT TO REMOVE.

- 1) Install the terminal block cover (17). Tighten the screws (16) to 20-22 inch-pounds (2.25-2.48 newton meters).

S 434-062

- (28) Put the exhaust duct and the V-band clamp in position on the APU (Fig. 402).
  - (a) Tighten the V-band clamp to 70-90 inch-pounds (7.91-10.17 newton meters) (Fig. 402).

S 094-063

- (29) Remove the exhaust duct saddle (Fig. 402).

S 434-081

- (30) Make sure the protective cover on the oil cooler vent is removed.

**NOTE:** The oil cooler vent is downstream of the APU oil cooler.

S 614-217

- (31) Do the APU - Servicing procedure if it is necessary (AMM 12-13-04/301).

S 214-066

- (32) Make sure the drain tubes are in the center of the drain mast assembly.

EFFECTIVITY

ALL

49-11-01

08.1

Page 418  
Aug 22/09

S 214-258

- (33) Make sure the PDC2 tube has a minimum clearance of 0.2 inch (5.0 mm) from the aft right side vertical and diagonal support rods. You can adjust the p-clamps that hold the PDC2 line to the APU inlet plenum to obtain the correct clearance.

S 424-067

- (34) If necessary, install the generator (AMM 24-21-01/401).

S 864-069

- (35) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-071

- (36) Remove the DO-NOT-OPERATE tag from the APU control switch on the overhead panel P5.

S 744-073

- (37) Erase the BITE memory (AMM 49-61-05/201).

S 864-074

- (38) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).

S 714-075

- (39) Make sure the APU operates correctly.
- (a) Examine the APU for leakage.

S 864-076

- (40) Use the APU Operation procedure to do the APU shutdown (AMM 49-11-00/201).

S 744-077

- (41) Do the APU Control Unit BITE procedure (AMM 49-61-05/201).

S 414-078

- (42) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

EFFECTIVITY

ALL

49-11-01

07

Page 419  
Apr 22/09

- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

TASK 49-11-01-004-116

4. APU Removal (Hydraulic Jack Procedure) (Fig. 405, Fig. 406, Fig. 407, Fig. 408, Fig. 409)

A. References

- (1) AMM 21-00-21/201, Air Conditioning System Oil Smoke/Fume Contamination (Removal)
- (2) AMM 36-11-01/701, Pneumatic Duct

B. Special Tools and Equipment

- (1) APU Cradle Jack Equip - A49001-73 or A49001-83
- (2) APU Cradle Ballast - A49001-3 or A49001-17
- (3) APU Transportation Dolly - A49003-1 or A49003-12
- (4) APU Support Equip (includes support retainers, thread protectors, and exhaust duct support saddle) - A49004-1

C. Standard Tools and Equipment

- (1) Container - 1.5 U.S. Gallon (5.7 Liter) capacity, for fuel

D. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |
| 822   | Aft Cargo Door          |

E. Prepare for the APU Removal

S 864-117

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-118

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

EFFECTIVITY

ALL

49-11-01

S 014-121

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

#### F. APU Removal

S 034-122

- (1) Remove the electrical connections from the generator (Fig. 405).
- (a) Remove the terminal block cover (17) from the generator.
- (b) Remove the terminal nuts (18) and the washers (14), or the lock nut as applicable.
- (c) Remove the four power leads and identify for installation.
- (d) Install the terminal nuts (18) and the washers (14), or the lock nut on the terminal studs.
- (e) Install the terminal block cover (17) with the washers (15) and the screws (16).

S 034-123

- (2) Disconnect the APU harness, generator cables and starter motor cables from the supports on the APU (Fig. 405).

S 034-125

- (3) Disconnect the APU harness and starter motor cables at the firewall.

NOTE: The starter motor cables can be disconnected at the starter motor or at the firewall.

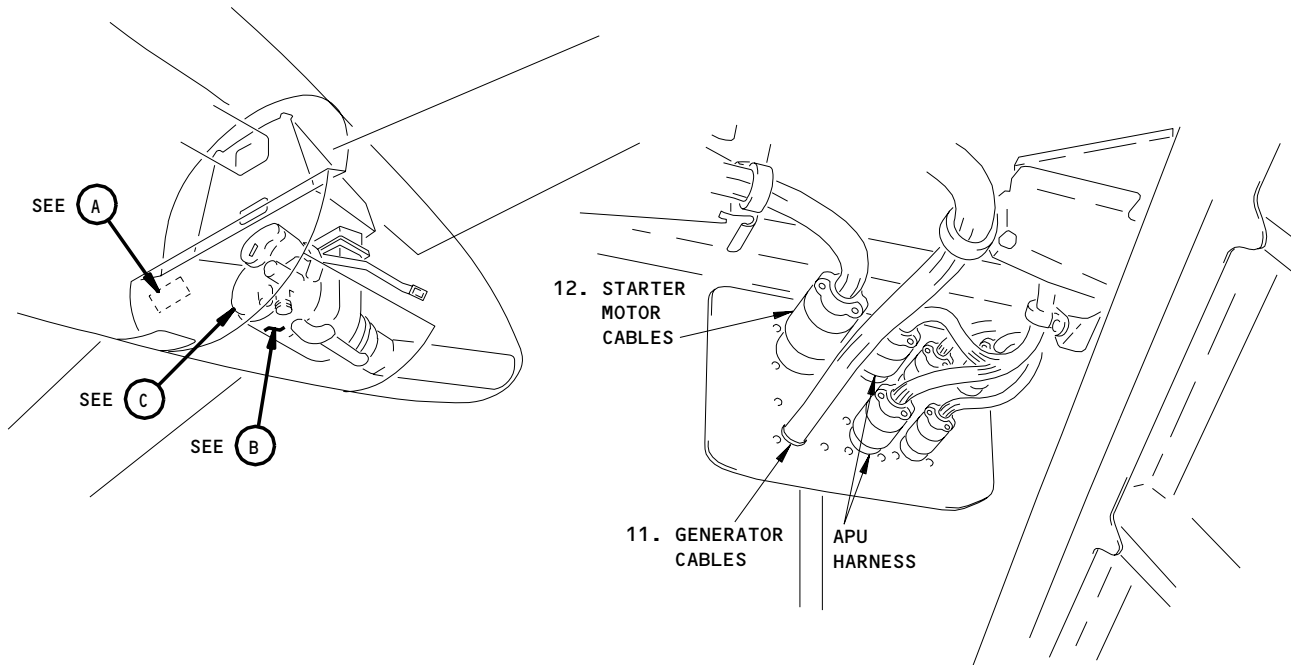
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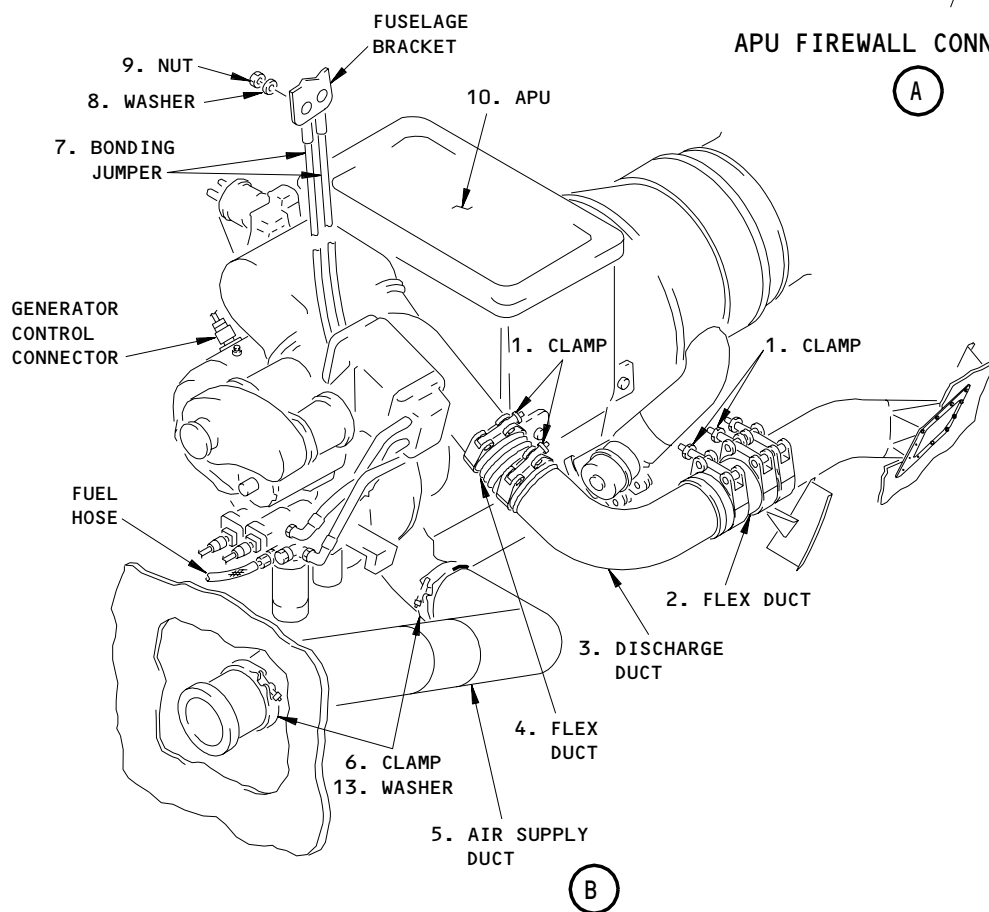
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09

Page 421  
Aug 22/05



APU FIREWALL CONNECTIONS



APU System Connections  
Figure 405 (Sheet 1)

EFFECTIVITY

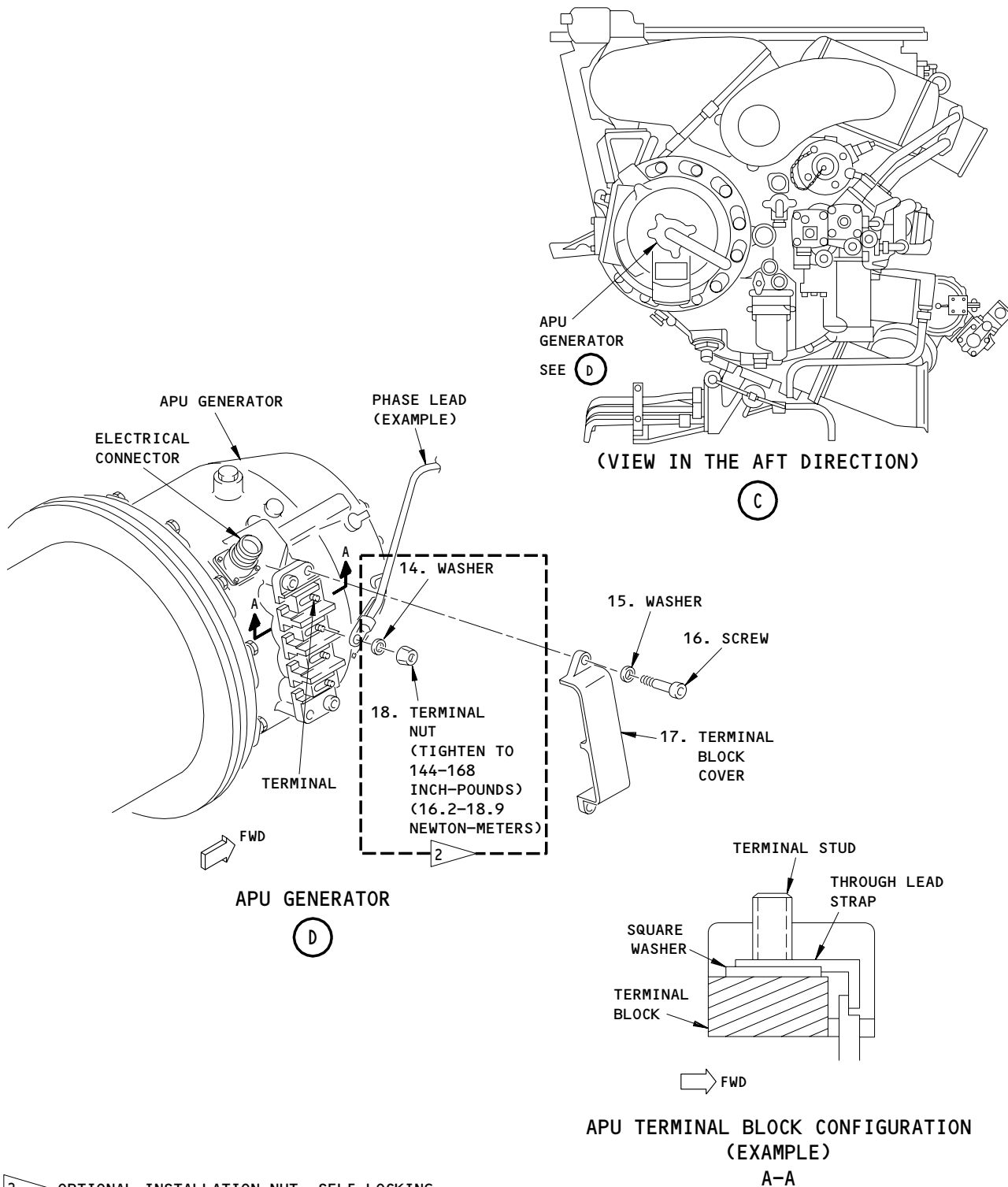
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49-11-01

05

Page 422  
Dec 10/98

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2 OPTIONAL INSTALLATION NUT, SELF-LOCKING, CAPTIVE WASHER PART NO. NAS1726-6D

APU System Connections  
Figure 405 (Sheet 2)

EFFECTIVITY	ALL
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49-11-01

01

Page 423  
Aug 22/01

- S 034-127
- (4) Remove the nuts (9) and washers (8) to disconnect the bonding jumper (7) from the fuselage.
- S 034-128
- (5) Disconnect the generator control connector from the generator.
- S 034-130
- (6) Remove the clamps (1), flex ducts (2, 4), and discharge duct (3).
- S 034-131
- (7) Loosen the clamps (6) on the air supply duct (5) at the left side of the APU.
- (a) Disengage the clamps (6) from the flange on the air supply duct (5).
- (b) Remove the air supply duct (5).
- S 034-132
- (8) Put caps on all of the openings of the air supply and oil-cooler-discharge ducts.
- S 494-135
- (9) Install the exhaust duct support saddle and tighten the buckles (Fig. 406).
- S 034-136
- (10) Loosen the V-band clamp and slide the exhaust duct aft (Fig. 406).
- S 494-137
- (11) Put the container below the fuel control unit.
- S 034-138
- (12) Disconnect the fuel hose at the fuel control unit (Fig. 405).
- (a) Let the fuel drain from the fuel hose.
- (b) Put caps on the openings of the fuel hose and the fuel control unit.
- S 494-148
- (13) Install the Hydraulic Jack (Fig. 409):
- (a) Put the hydraulic jack on the height adjustable stand.
- (b) Use a forklift to set the APU cradle assembly on the hydraulic jack.
- (c) Attach the APU cradle to the hydraulic jack with four bolts and nuts.
- (d) Turn the crank-down grips for the hydraulic jack stabilizers clockwise until the stabilizers touch the height adjustable stand. The hydraulic jack is now stable on the height adjustable stand.
- (e) Disconnect the yoke from the cradle.
- (f) Attach the yoke to the forward mounts on the APU.

EFFECTIVITY

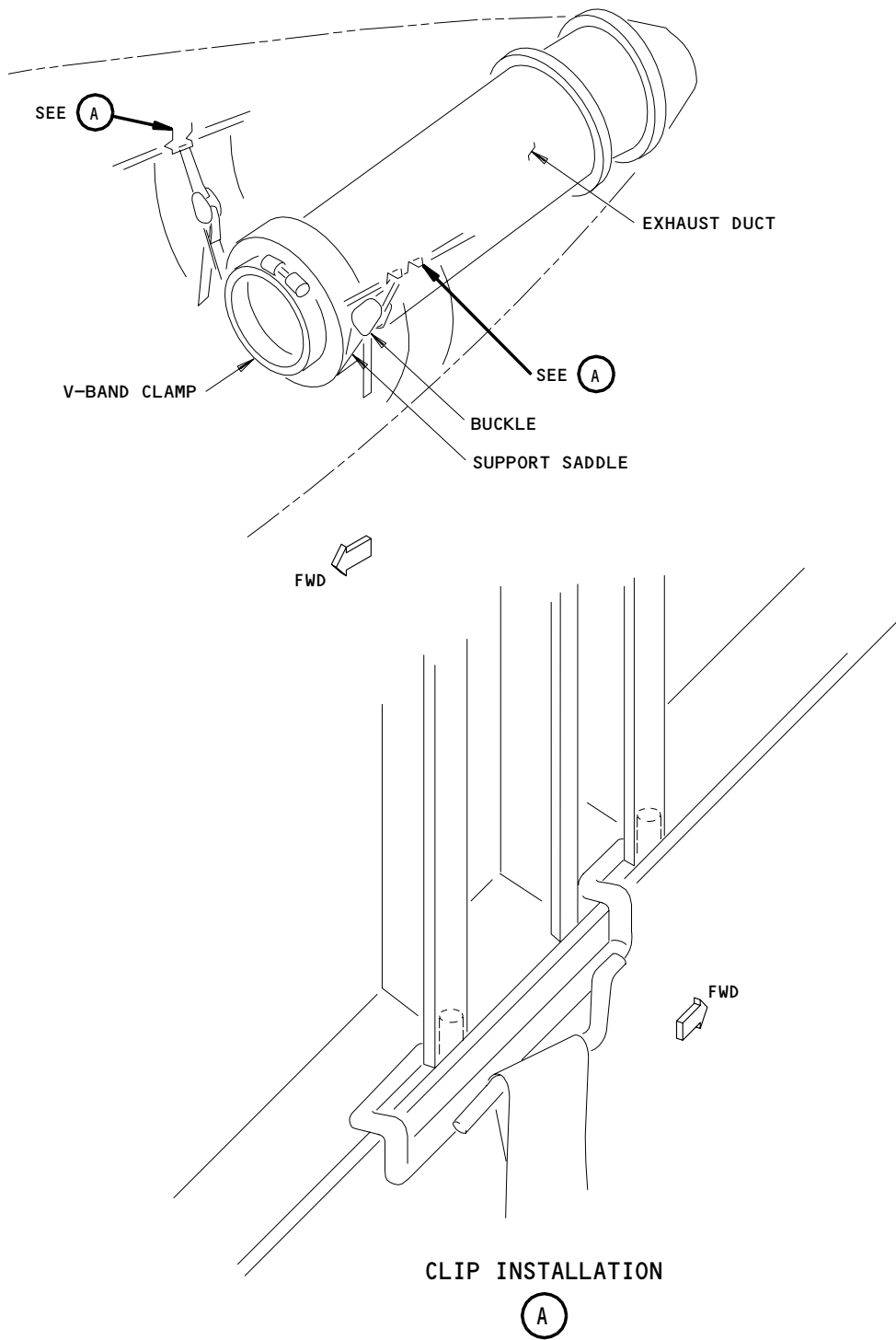
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49-11-01

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Page 424  
Dec 22/05

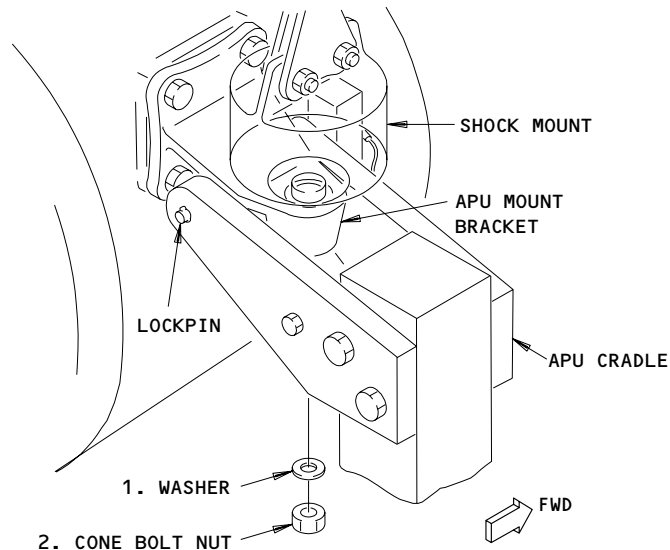
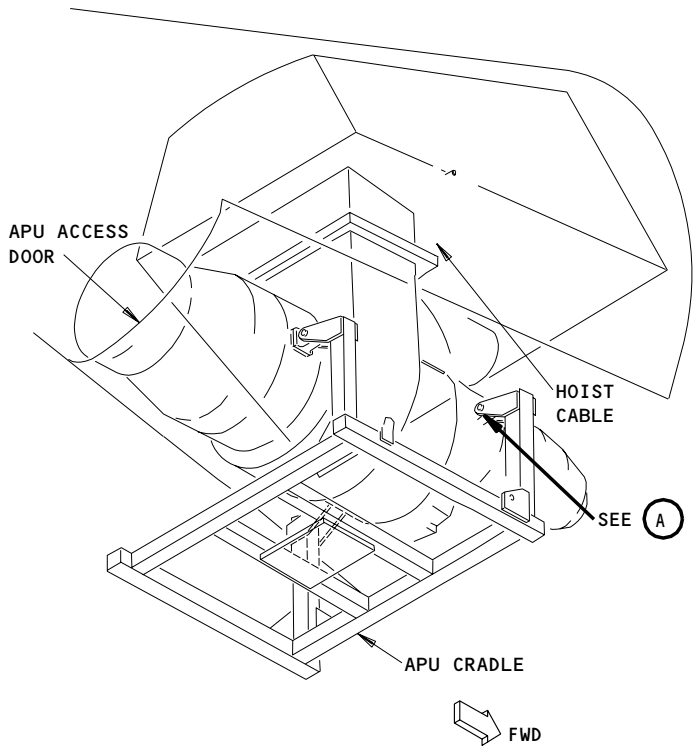




APU Exhaust Duct Support Saddle - Installation  
Figure 406

EFFECTIVITY	
	ALL

49-11-01

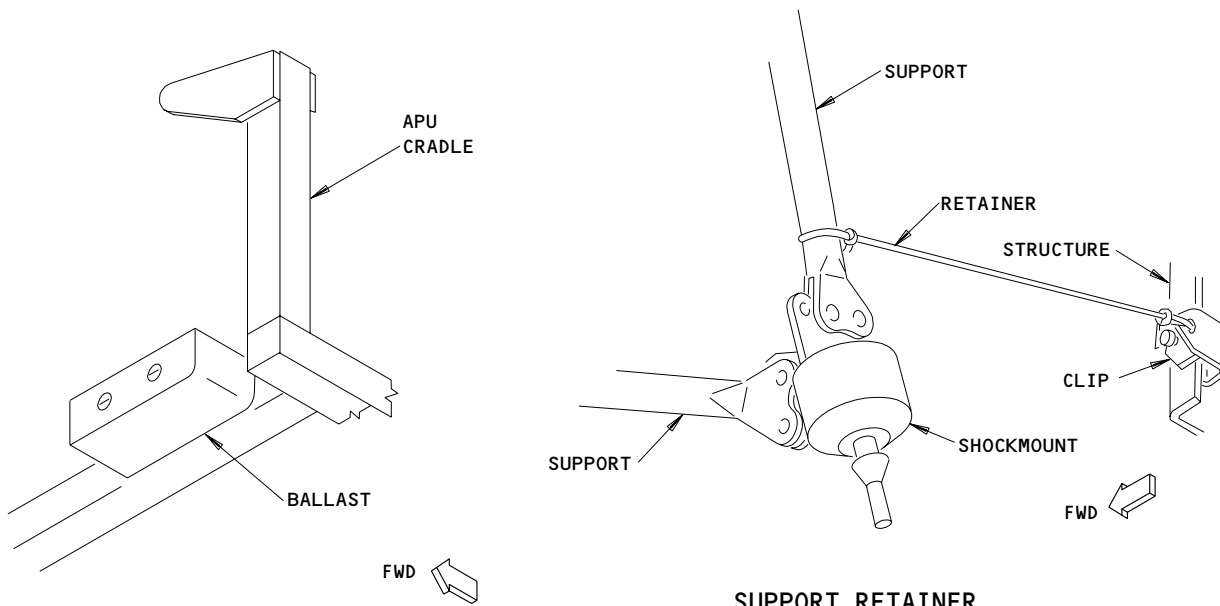


(EXAMPLE)  
(A)

Cradle Installation  
Figure 407

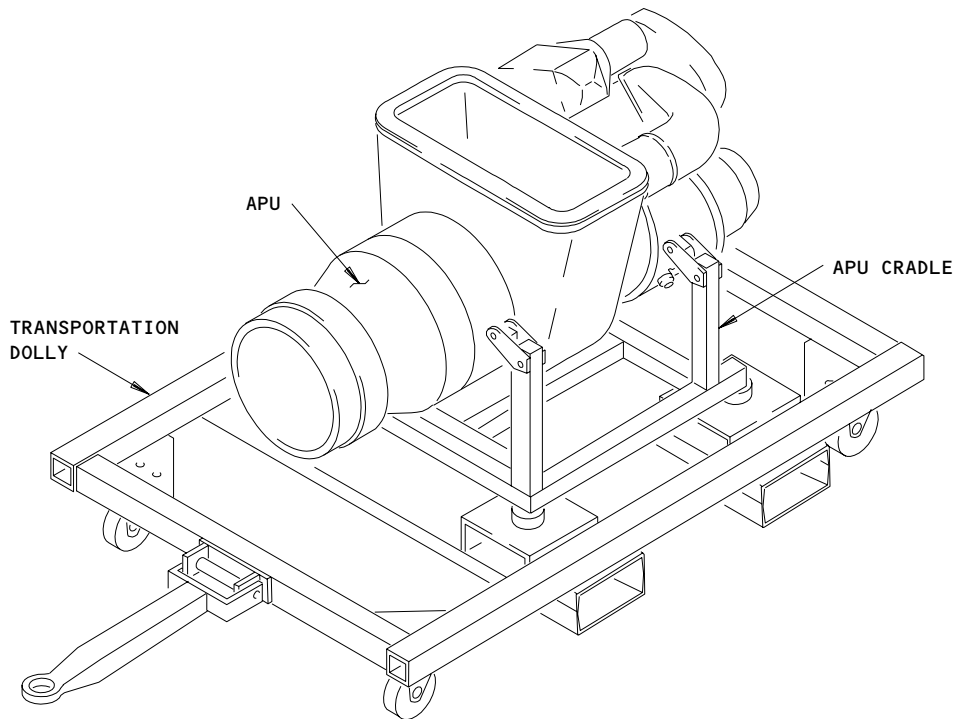
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49-11-01



APU CRADLE BALLAST

SUPPORT RETAINER



APU TRANSPORTATION DOLLY

APU Installation  
Figure 408

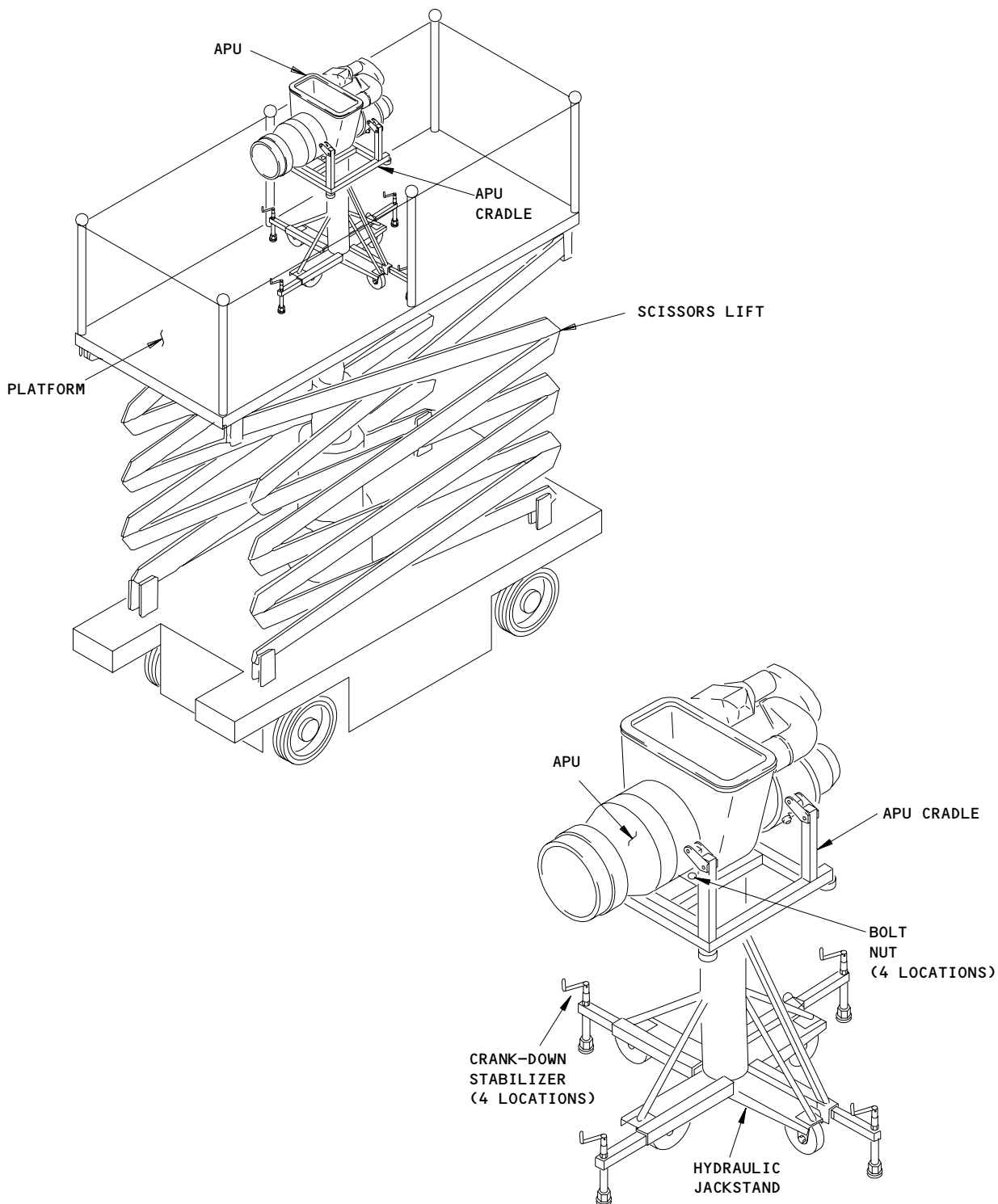
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	ALL

49-11-01

01

Page 427  
Dec 10/98

699893



Auxiliary Power Unit Installation - Jackstand Method  
Figure 409

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49-11-01

- (g) Make sure the cradle correctly engages the saddle.
- (h) Install the safety pins.
- (i) Connect the rear part of the cradle to the lugs on the sides of the APU.
- (j) Raise the APU a sufficient amount to take the weight off of the APU mounts (Fig. 407).

**NOTE:** The weight of an APU with oil in it and the support equipment is approximately 700 pounds (320 kg).

S 034-149

- (14) Remove the cone bolt nuts (2) and washers (1) from the forward and aft mounts.

**NOTE:** Use an open end wrench on the shaft flats between the mount bracket and the shockmount. This holds the shaft while you remove the cone bolt nuts.

S 034-150

- (15) Lower the APU (10) until the mount brackets are free of the cone bolts.

S 044-151

- (16) Move the aft shockmounts on the right side outboard and install the retainer on the supports (Fig. 408).
  - (a) With the APU secured to the APU cradle, lower the height adjustable stand. Use a forklift to remove the APU from the hydraulic jack and place the APU on the APU dolly.

S 214-242

- (17) Visually examine the air supply duct (5) for signs of oil and other contamination.
  - (a) If you find signs of oil and other contamination, then do these tasks:
    - 1) Clean the air supply duct (5). To clean it, do this task: Cleaning the Bare Titanium Ducts (AMM 36-11-01/701).
    - 2) Remove the oil contamination from the air conditioning and pneumatic systems. To remove it, do this task: Removal of Oil Contamination from the Air Conditioning and Pneumatic Systems (AMM 21-00-21/201).

EFFECTIVITY

ALL

49-11-01

04

Page 429  
Dec 22/05

TASK 49-11-01-404-153

5. APU Installation (Hydraulic Jack Procedure) (Fig. 405, Fig. 406, Fig. 407, Fig. 408, Fig. 409)

**NOTE:** If you install a new APU, install the bonding jumper (7) and the starter motor cables (12) with the APU on the ground. Also, do the APU - Servicing procedure (AMM 12-13-04/301) before you install the APU.

**A. Equipment**

- (1) APU Cradle Jack Equip - A49001-73 or A49001-83
- (2) APU Cradle Ballast - A49001-3 or A49001-17
- (3) APU Transportation Dolly - A49003-1 or A49003-12
- (4) APU Support Equip (includes support retainers, thread protectors, and exhaust duct support saddle) - A49004-1

**B. Parts**

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
405	10	Auxiliary Power Unit	49-11-00	01	80, 81 or 82

**C. References**

- (1) AMM 12-13-04/301, Servicing (Oil Fill)
- (2) AMM 24-21-01/401, APU Generator
- (3) AMM 49-11-00/201, Auxiliary Power Unit
- (4) AMM 49-13-00/601, APU Mounts
- (5) AMM 49-61-05/201, APU Control Unit
- (6) AMM 49-94-04/401, Oil Quantity Transmitter

**D. Access**

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

EFFECTIVITY

ALL

**49-11-01**

03

Page 430  
Aug 22/05

E. APU Installation

S 214-155

- (1) Before you install the APU, visually examine both the airplane and the APU mount assemblies for cracks, wear, or damage (AMM 49-13-00/601).

S 434-157

- (2) If it is necessary, remove the covers from the APU inlet plenum and from the APU exhaust duct.

S 214-221

- (3) Examine the APU inlet plenum and air inlet ducts for foreign objects, chips and cracks.

S 214-227

- (4) Do a check for the oil quantity transmitter on the new APU (AMM 49-94-04/401):

**NOTE:** The part number for the oil quantity transmitter is 8TJ99GGE1 (Boeing part number S351N101-1).

- (a) If the oil quantity transmitter is not installed, then do these steps to replace with an oil quantity transmitter:

**NOTE:** The low oil level switch can be installed on the new APU. It is necessary to replace it with an oil quantity transmitter.

- 1) Remove the low oil level switch from the new APU.
- 2) Do this task: Oil Quantity Transmitter Installation (AMM 49-94-04/401).

S 494-162

**WARNING:** INSTALL THE BALLAST ON THE CRADLE IF THE GENERATOR IS REMOVED. WITHOUT THE GENERATOR, THE APU IS NOT BALANCED AND CAN CAUSE DAMAGE TO EQUIPMENT OR INJURY TO PERSONS.

- (5) Install the ballast on the cradle if the generator is removed.

S 494-176

- (6) Install the Hydraulic Jack (Fig. 409):
  - (a) Put the hydraulic jack on the height adjustable stand.
  - (b) Use a forklift to set the APU and the APU cradle assembly on the hydraulic jack.
  - (c) Attach the APU and the APU cradle to the hydraulic jack with four bolts and nuts.

EFFECTIVITY

ALL

49-11-01

- (d) Turn the crank-down grips for the hydraulic jack stabilizers clockwise until the stabilizers touch the height adjustable stand. The hydraulic jack is now stable on the height adjustable stand.
- (e) Disconnect the yoke from the cradle.
- (f) Attach the yoke to the forward mounts on the APU.
- (g) Make sure the cradle correctly engages the saddle.
- (h) Install the safety pins.
- (i) Connect the rear part of the cradle to the lugs on the sides of the APU.

S 824-177

- (7) Lift the APU until the cone bolts are engaged.

S 024-178

- (8) Remove the thread protectors from the cone bolts.

S 424-179

- (9) Install new cone bolt washers (1) and nuts (2) or use washers and nuts that had a dye penetrant inspection (Fig. 407).
  - (a) Do the torque limit test for the three nuts (2):
    - 1) Tighten the three nuts (2) to a run-on torque of not more than 100 inch-pounds (11.3 newton-meters) until you can see one to two full threads and the cone bolt chamfer extends below each nut.

NOTE: Use an open-end wrench on the shaft flats between the APU mounting bracket and the shockmount to hold the shaft.

- 2) Make sure the three washers (1) do not touch the bottom surface of the three APU mounting brackets.
    - 3) Make sure the break-away torque necessary to turn the three nuts from this position is more than 14 inch-pounds (1.6 newton-meters).
    - 4) Replace the nut(s) that do not meet the torque limits in the above steps.
  - (b) Tighten the nuts completely to 475-525 inch-pounds (53.68-59.33 newton meters).

S 024-180

- (10) Remove the cradle from the APU (Fig. 407).
  - (a) Remove the lockpins from the mount brackets.
  - (b) Lower the cradle and the hydraulic jack away from the airplane.

S 434-181

- (11) Attach the bonding jumper (7) to the fuselage with the washers (8) and nuts (9) (Fig. 405).

S 434-182

- (12) Remove the dust caps from all of the air ducts.

EFFECTIVITY

ALL

49-11-01

07

Page 432  
Aug 22/05



S 434-183

- (13) Install the air supply duct (5).  
(a) Tighten the clamps (6) to 50-70 inch-pounds (5.65-7.91 newton meters).

NOTE: If necessary, use a washer under the clamp nut to get the torque above.

S 434-184

CAUTION: MAKE SURE THE COOLING AIR DUCT IS ALIGNED CORRECTLY AND IS NOT DAMAGED. THE COOLING AIR DUCT MUST BE CORRECTLY INSTALLED OR THE OIL TEMPERATURE CAN NOT BE SUFFICIENTLY DECREASED.

- (14) Put the oil cooling air duct assembly (1, 2, 3, 4) in position.  
(a) Make sure the clamps (1) are a minimum of 0.06 inches in from the edge of the flex duct (2).  
(b) Tighten the clamps (1) to 10-20 inch-pounds (1.13-2.26 newton meters).

S 434-185

CAUTION: DO NOT TWIST THE FUEL TUBE OR YOU CAN CAUSE A BLOCKAGE AND THE APU CANNOT GET ENOUGH FUEL.

- (15) Remove the caps from the fuel hose and the fuel control unit.

S 434-186

- (16) Install the fuel hose.

S 434-189

- (17) Connect the generator control to the APU:  
(a) Install a lockwire on the generator control.

S 434-190

- (18) Remove the caps from the electrical connectors and receptacles.

S 434-193

- (19) Connect the APU harness and starter motor cables at the firewall.

NOTE: Connect the starter motor cables at the starter motor if necessary.

S 434-194

- (20) Install the harness fasteners on the supports and on the firewall.

EFFECTIVITY

ALL

49-11-01

07

Page 433  
Aug 22/05

S 434-195

- (21) If the generator is installed on the APU, connect the electrical connections.
- (a) Remove the terminal block cover (1) from the generator.
  - (b) Make sure that the terminals on the APU generator are properly assembled. Square washers go under the through lead straps.

**CAUTION:** ENSURE MATCHING OF CONDUCTORS AND TERMINALS. INCORRECT INSTALLATION WILL RESULT IN CIRCUIT MALFUNCTION AND/OR DAMAGED EQUIPMENT.

**CAUTION:** INSTALL ROUND WASHERS BETWEEN TERMINAL NUT AND PHASE LEAD. DO NOT INSTALL ANY WASHERS BENEATH PHASE LEADS. TO DO SO WILL RESULT IN LOCALIZED RESISTANCE HEATING WHICH COULD CAUSE BURNING OF THE TERMINAL BLOCK.

- (c) Put the four leads on the generator terminal studs.
- (d) Install the washers (14) and the terminal nuts (18) or the lock nut as applicable.
- (e) Tighten the terminal nuts to 144-168 inch-pounds (16.2-18.9 newton meters).

**CAUTION:** DO NOT APPLY RTV MATERIAL TO GENERATOR TERMINALS. USE OF RTV MATERIAL WILL MAKE TERMINAL BLOCK COVER DIFFICULT TO REMOVE.

- 1) Install the terminal block cover (17). Tighten the screws (16) to 20-22 inch-pounds (2.25-2.48 newton meters).

S 434-196

- (22) Put the exhaust duct and the V-band clamp in position on the APU (Fig. 406).
- (a) Tighten the V-band clamp to 70-90 inch-pounds (7.91-10.17 newton meters) (Fig. 406).

S 094-197

- (23) Remove the exhaust duct saddle.

S 434-198

- (24) Make sure the protective cover on the oil cooler vent is removed.

**NOTE:** The oil cooler vent is downstream of the APU oil cooler.

EFFECTIVITY

ALL

49-11-01

06

Page 434  
Aug 22/05

- S 614-218
- (25) Do the APU – Servicing procedure if it is necessary (AMM 12-13-04/301).
- S 214-200
- (26) Make sure the drain tubes are in the center of the drain mast assembly.
- S 214-259
- (27) Make sure the PDC2 tube has a minimum clearance of 0.2 inch (5.0 mm) from the aft right side vertical and diagonal support rods. You can adjust the p-clamps that hold the PDC2 line to the APU inlet plenum to obtain the correct clearance.
- S 424-201
- (28) If necessary, install the generator (AMM 24-21-01/401).
- S 864-203
- (29) Remove the DO-NOT-CLOSE tags and close these circuit breaker:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
- S 864-205
- (30) Remove the DO-NOT-OPERATE tag from the APU control switch on the overhead panel P5.
- S 744-208
- (31) Erase the BITE memory (AMM 49-61-05/201).
- S 864-209
- (32) Use the APU Operation procedure to start the APU (AMM 49-11-00/201).
- S 714-210
- (33) Make sure the APU operates correctly.
- (a) Examine the APU for leakage.
- S 864-211
- (34) Use the APU Operation procedure to do the APU shutdown (AMM 49-11-00/201).
- S 744-212
- (35) Do the APU Control Unit BITE procedure (AMM 49-61-05/201).

EFFECTIVITY

ALL

**49-11-01**

10

Page 435  
Apr 22/09

S 414-213

(36) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-11-01

08

Page 436  
Dec 22/08

AUXILIARY POWER UNIT – MAINTENANCE PRACTICES

1. General

- A. There are two tasks in this procedure. The first task is used to do the APU system deactivation so the airplane can be used without an APU. The second task is used to do the APU system activation.
- B. It is necessary to do these steps to do the APU system deactivation: Remove the APU, safety the APU mounts, remove the exhaust duct, and remove the fuel hose. It is also necessary to put caps on the electrical connectors, the pneumatic ducts, and the exhaust duct. INOP tags are put on switches and circuit breakers in the control cabin and on the E6 rack in the aft equipment center.
- C. The removal of the APU reduces the weight of the airplane by 526 pounds (239 kilograms). Refer to the Weight and Balance Manual to correct the operational characteristics for the airplane. The APU weighs 530 pounds (241 kilograms). The APU compartment deactivation kit weighs 4 pounds (2 kilograms).

TASK 49-11-02-042-001

2. APU System Deactivation

A. Equipment

- (1) Kit, Conversion for Alternate Dispatch with APU Removed – 015T0212-1
  - (a) Placards – Switch (5)
  - (b) Placards – Circuit Breakers (4)
  - (c) Collars – Circuit Breakers (4)
  - (d) Kit – Deactivation, APU Compartment – 351T0102-1
    - 1) Caps, Electrical Connector (5)
    - 2) Support Assembly
    - 3) Plug Assembly, exhaust duct port
    - 4) Cap Assembly, oil cooling air discharge port
    - 5) Cap, APU bleed air duct
    - 6) Cap, fuel hose
    - 7) Washers (6)
    - 8) Bolts (6)
- (2) Nylon Cord, 5/32-inch diameter

B. References

- (1) AMM 32-00-15/201, Landing Gear Door Locks
- (2) AMM 49-11-01/401, Auxiliary Power Unit

EFFECTIVITY

ALL

49-11-02

01

Page 201  
Aug 22/07

(3) AMM 49-61-05/201, APU Control Unit

C. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
313 Stabilizer Compartment, Left  
315 APU Compartment - Left  
316 APU Compartment - Right  
532 Main Tank - Left

(2) Access Panels

313AL Controls Access Door  
315AL APU Access Door - Left  
316AR APU Access Door - Right  
732AL Main Landing Gear Door - Left  
822 Aft Cargo Door

D. Do the APU system deactivation for the control cabin, the fuel shutoff valve, and the APU shutoff valve (Fig. 201 and 202).

S 862-002

(1) Put the main battery switch on the overhead panel P5 in the ON position.

S 042-003

(2) Make sure the air intake door and the fuel shutoff valve are closed as follows:

(a) Put the APU control switch on the overhead panel P5 in the ON position.

**NOTE:** The FAULT light will come on while the fuel shutoff valve opens.

(b) Make sure the air intake door for the APU is open.

**WARNING:** USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

(c) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).

(d) Find the fuel shutoff valve on the dry side of the main fuel tank in the left wing.

1) Make sure the fuel shutoff valve for the APU is open.

(e) Put the APU control switch in the OFF position.

**NOTE:** The FAULT light will come on when the fuel shutoff valve closes.

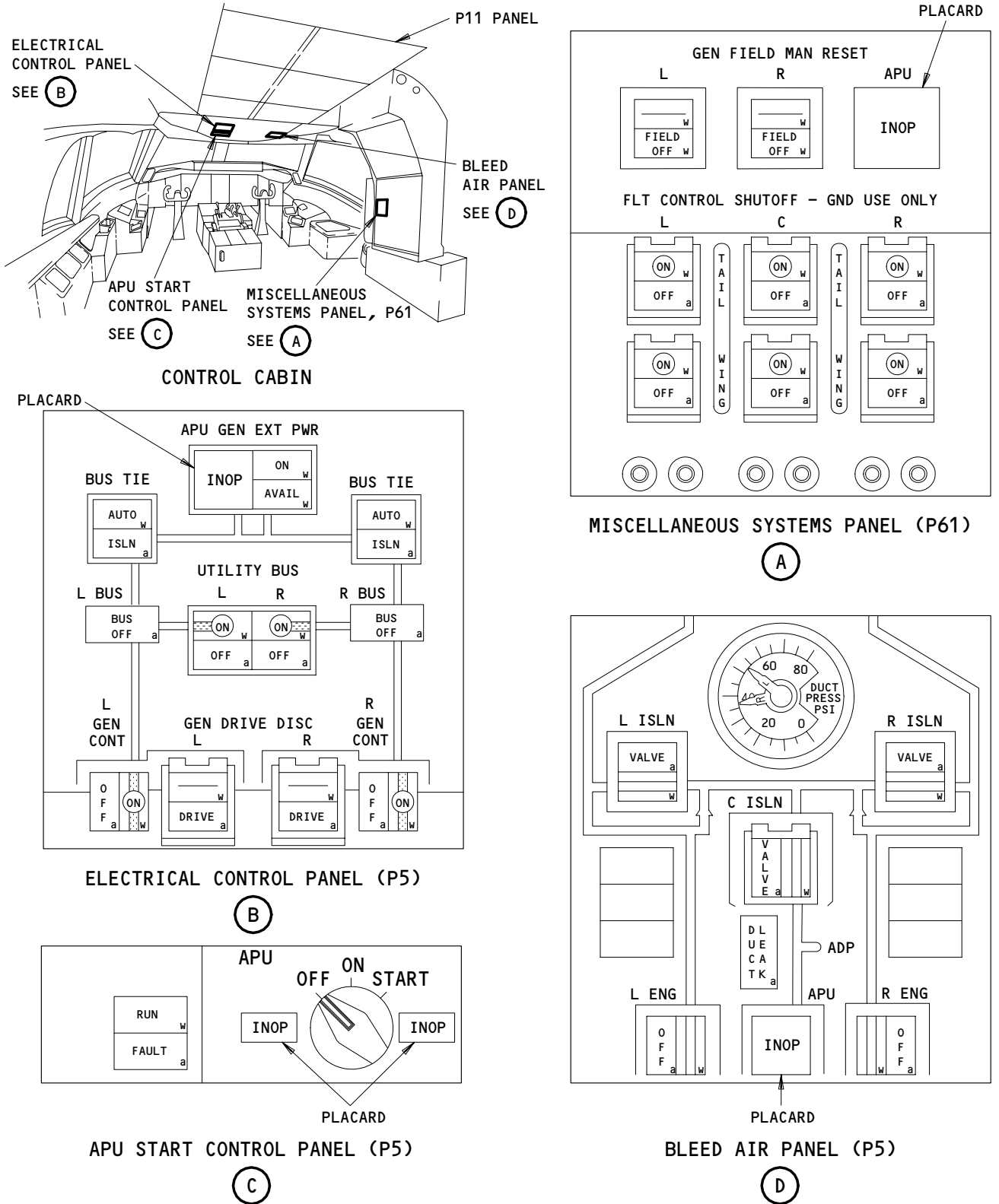
EFFECTIVITY

ALL

49-11-02

01

Page 202  
Aug 22/01



APU System Deactivation - Control Cabin  
Figure 201

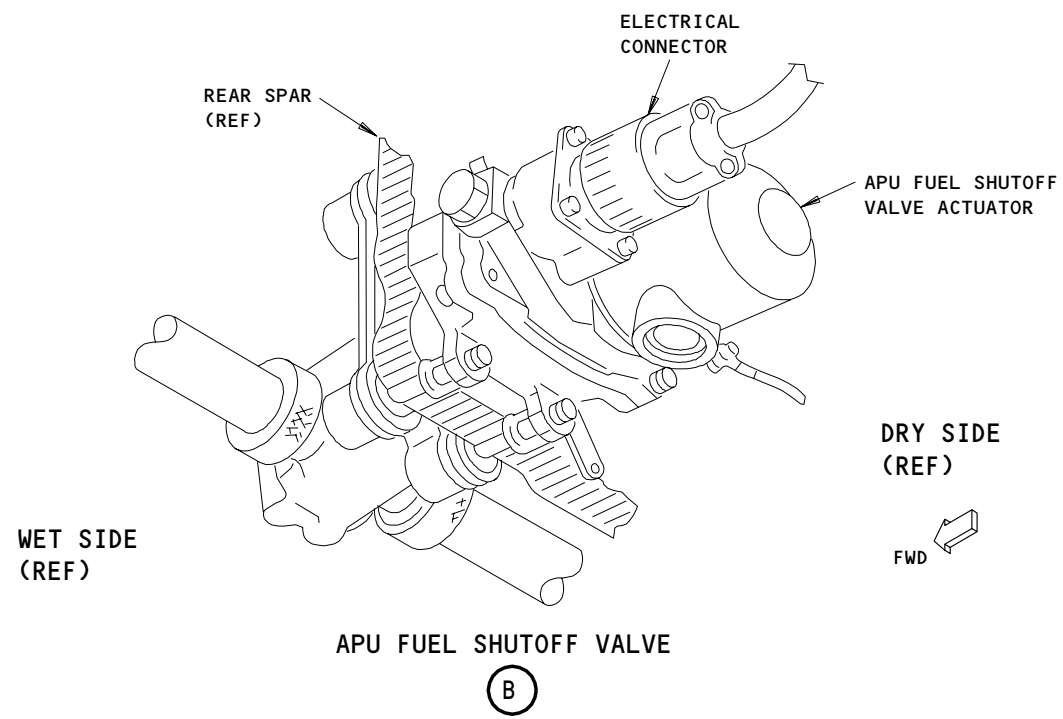
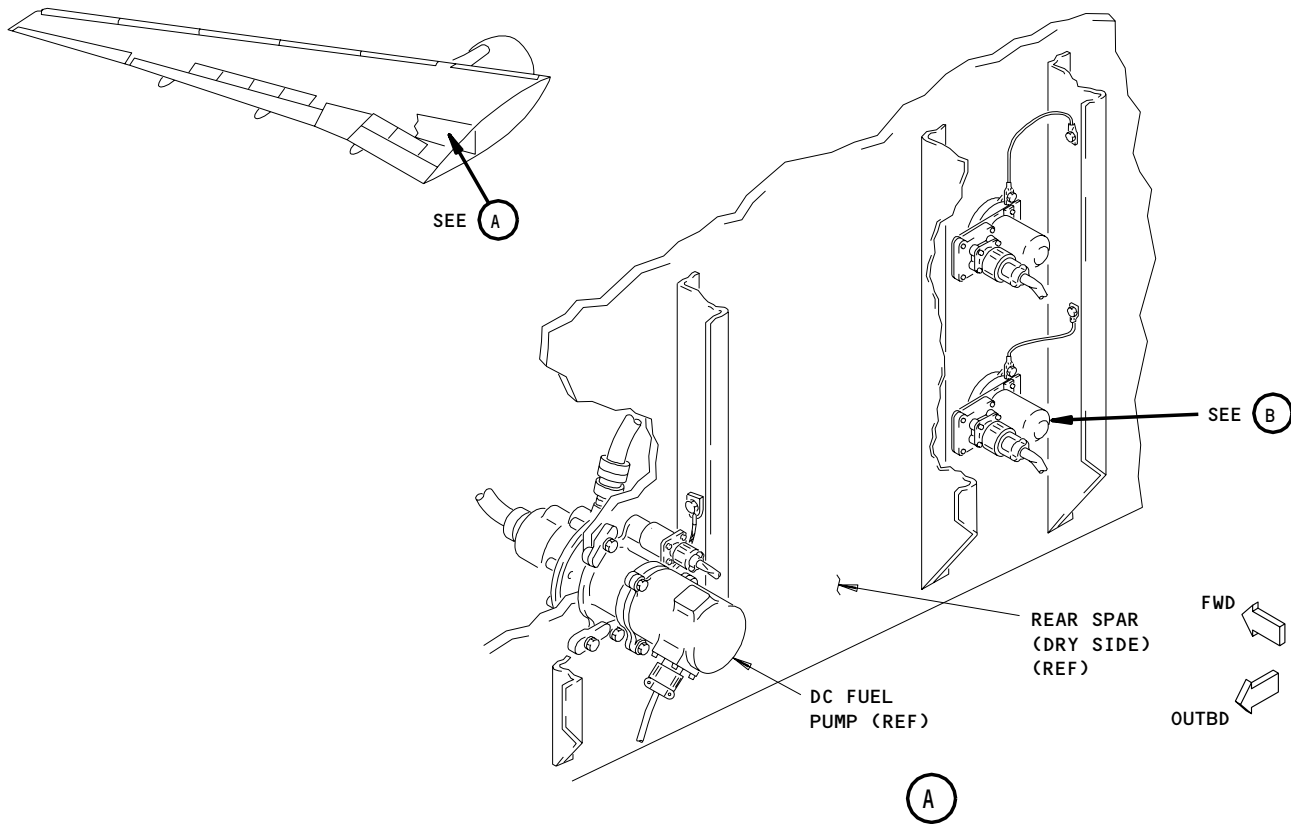
EFFECTIVITY

ALL

49-11-02

01

Page 203  
May 10/90

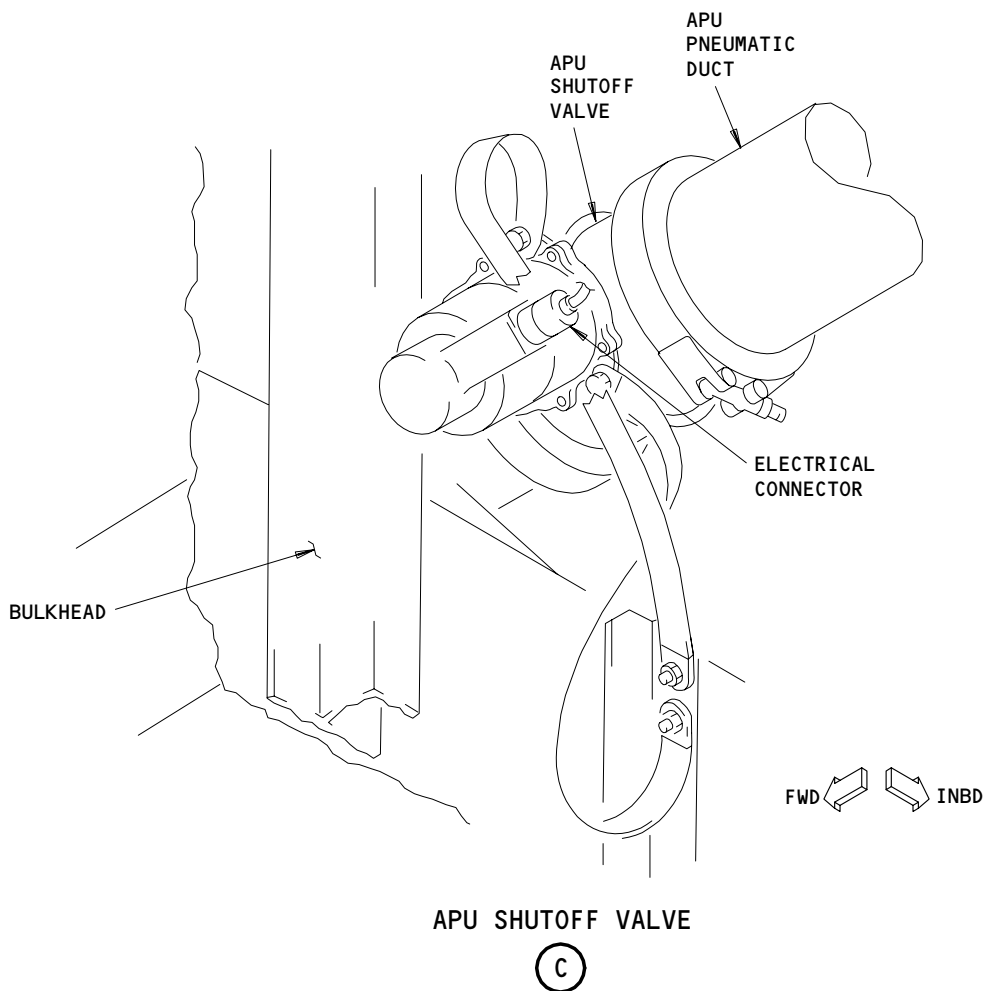
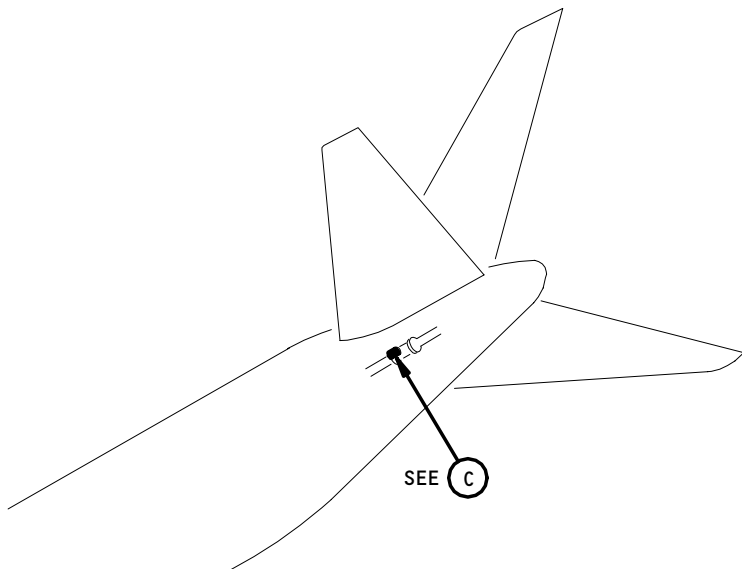


APU System Deactivation - APU Fuel Shutoff and APU Shutoff Valves  
Figure 202 (Sheet 1)

EFFECTIVITY	
	ALL

49-11-02





APU System Deactivation - APU Fuel Shutoff and APU Shutoff Valves  
Figure 202 (Sheet 2)

EFFECTIVITY	
	ALL

49-11-02

01

Page 205  
May 10/90

 **BOEING**  
767  
MAINTENANCE MANUAL

- (f) Make sure the air intake door for the APU is closed.
- (g) Make sure the fuel shutoff valve for the APU is closed.
- (h) Disconnect the electrical connector from the fuel shutoff valve.
  - 1) Put caps on the electrical connector and on the fuel shutoff valve.

**WARNING:** USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (i) Remove the door locks from the landing gear doors and close the doors (AMM 32-00-15/201).

S 042-004

- (3) Close the APU shutoff valve for the airplane pneumatic system.
  - (a) Make sure the bleed air switch for the APU, on the overhead panel P5, is in the closed position.

**NOTE:** The light for the APU bleed air should be off.

**WARNING:** THE CONTROLS ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT TO GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (b) Open the controls access door, 313AL.
- (c) Make sure the APU shutoff valve in the stabilizer compartment is closed.
- (d) Remove the electrical connector from the APU shutoff valve.
  - 1) Put caps on the electrical connector and on the APU shutoff valve.
- (e) Close the controls access door, 313AL.

S 862-005

- (4) Put the main battery switch on the overhead panel P5 in the OFF position.

S 862-006

- (5) Open these circuit breakers on the overhead panel P11 and attach collars and INOP tags:
  - (a) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-11-02

02.1

Page 206  
Aug 22/09

(b) 11S23, APU BLEED PWR

S 862-007

(6) Put the APU GEN switch on the overhead panel P5 in the ON position.

NOTE: The APU GEN switch is put in the ON position so the APU GEN OFF message does not show on EICAS.

S 862-008

(7) Install INOP tags on the APU generator and on the APU bleed air switches on the overhead panel P5.

S 862-009

(8) Install INOP tags on each side of the APU control switch on overhead panel P5.

S 862-010

(9) Install an INOP tag on the manual reset switch for the APU generator field on the right side panel P61.

E. Do the APU system deactivation for the E6 Rack in the aft equipment center (Fig. 203).

S 862-047

(1) Open these circuit breakers on the P49 APU Auxiliary Panel and install collars and INOP tags:

(a) 49C2, APU PRIME CONT

(b) 49C3, APU START

(c) 49C4, APU INLET DOOR ACT

F. Do the APU system deactivation for the APU compartment (Fig. 204).

S 022-011

(1) Do this task: APU Removal (AMM 49-11-01/401).

NOTE: The electrical harness for the starter motor must be disconnected from the firewall when you do the APU system deactivation.

S 092-013

(2) Remove the hoist beam from the airplane.

S 032-014

(3) Put caps on the firewall connectors for the APU harness, the starter motor, and the generator.

S 032-015

(4) Remove the fuel hose at the firewall.

(a) Put a cap on the connector for the fuel hose at the firewall.

1) Tighten the cap to 340-380 inch-pounds (38.4-42.9 newton-meters).

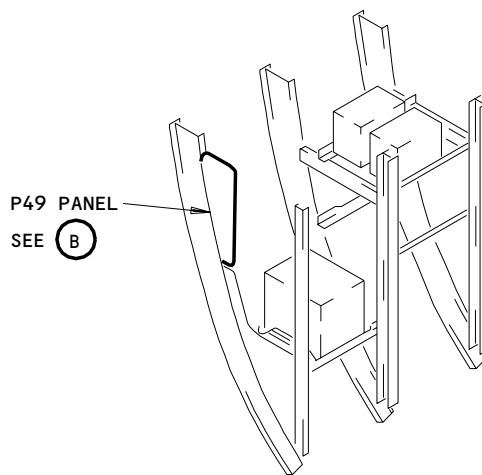
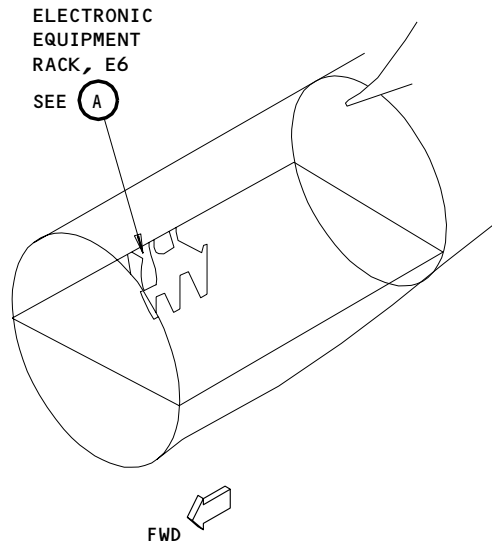
EFFECTIVITY

ALL

49-11-02

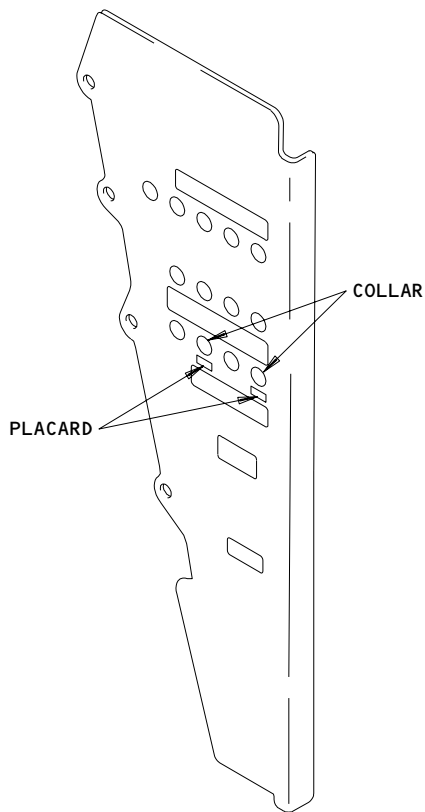
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Page 207  
Apr 22/04



ELECTRONIC EQUIPMENT RACK, E6

(A)



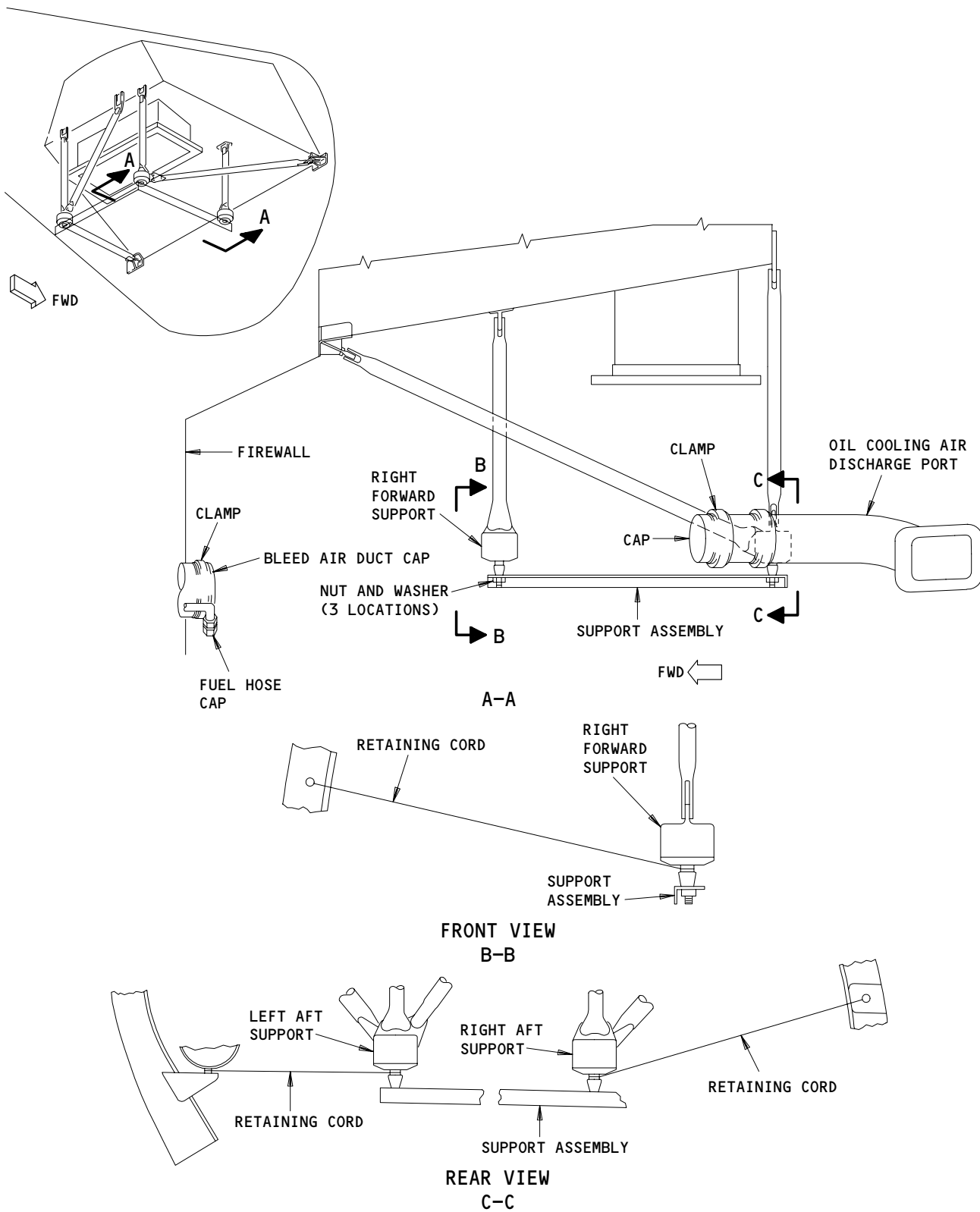
P49 PANEL

(B)

APU System Deactivation - E6 Rack  
Figure 203

EFFECTIVITY	
	ALL

49-11-02



APU System Deactivation - APU Compartment  
Figure 204 (Sheet 1)

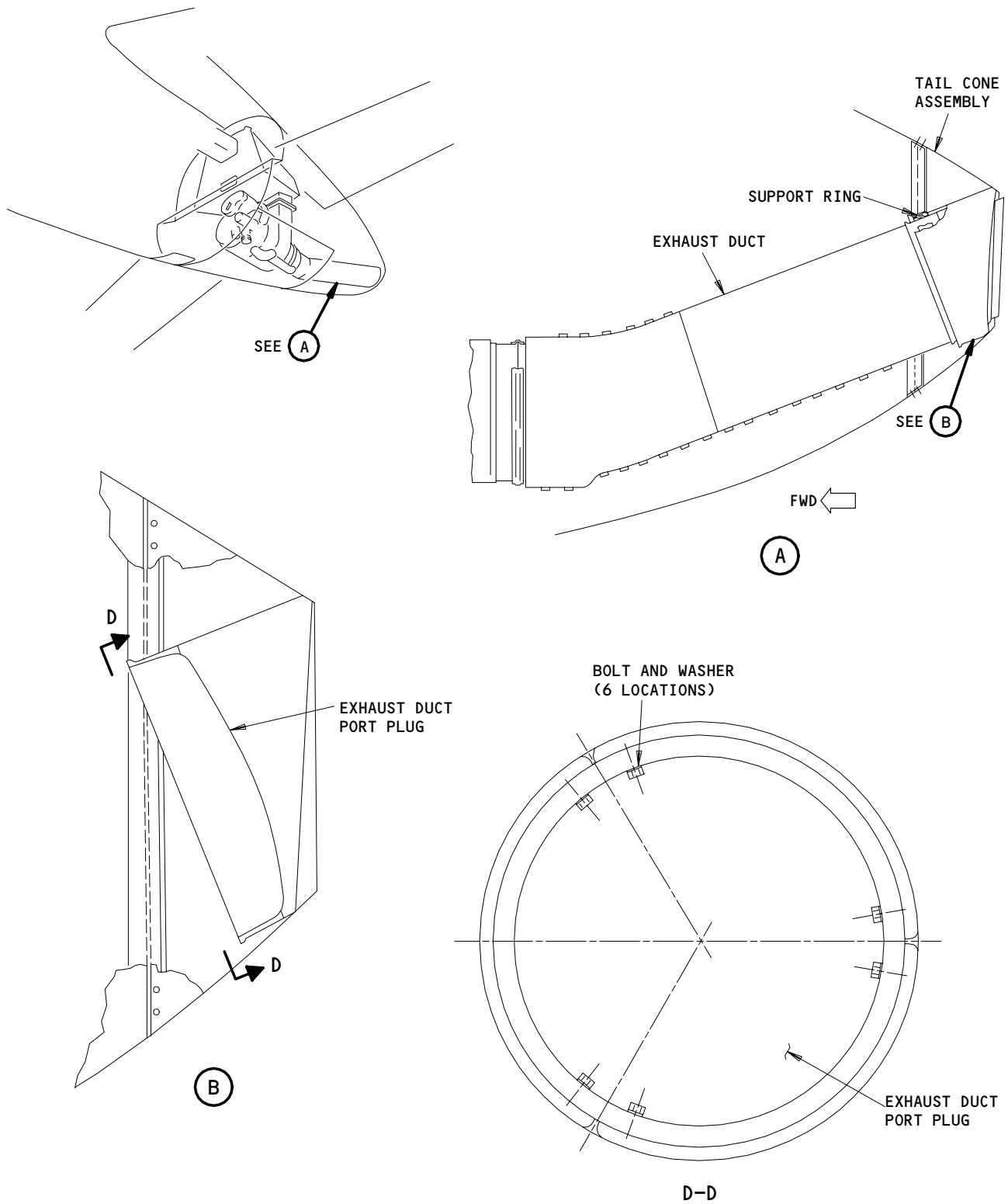
EFFECTIVITY

ALL

49-11-02

01

Page 209  
May 10/90



APU System Deactivation - APU Compartment  
Figure 204 (Sheet 2)

EFFECTIVITY	
	ALL

49-11-02

S 032-016

- (5) Install a cap on the air discharge duct with a clamp.  
(a) Tighten the clamp to 10-20 inch-pounds (1.13-2.26 newton meters).

S 032-017

- (6) Put a cap on the air supply duct at the firewall with a clamp.  
(a) Tighten the clamp to 50-70 inch-pounds (5.65-7.91 newton meters).

S 022-018

**WARNING:** BE CAREFUL WHEN YOU MOVE THE APU EXHAUST DUCT. THE APU EXHAUST DUCT WEIGHS APPROXIMATELY 60 POUNDS (27.3 KILOGRAMS). INJURY TO PERSONS CAN OCCUR.

**CAUTION:** KEEP THE INSULATION BLANKET AWAY FROM SHARP OBJECTS. YOU CAN CAUSE DAMAGE TO THE INSULATION BLANKET WITH SHARP OBJECTS.

- (7) Remove the APU exhaust duct as follows:  
(a) Move the APU exhaust duct forward and lower the duct through the APU access doors.  
(b) Remove the support saddle from the APU exhaust duct.  
(c) Remove the six bolts and washers (Fig. 204) from the support ring.  
1) Keep the six bolts and washers with the APU.  
(d) Put the plug assembly on the support and install bolts and washers.

S 492-019

- (8) Put the support assembly on the APU mounts.  
(a) Install the cone bolt nuts and washers.  
(b) Tighten the cone bolt nuts to 5-8 inch-pounds (0.56-0.90 newton meters).

S 492-020

- (9) Attach the nylon cord to the three APU supports with 20-100 pounds (9.1-45.4 Kg) of tension.

S 412-021

- (10) Close the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

EFFECTIVITY

ALL

49-11-02

01

Page 211  
Dec 22/07

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 212-022

- (11) Make an inspection of the APU compartment after the first flight and then every 100 hours until you do the APU system activation.

TASK 49-11-02-442-023

3. Do the APU System Activation

A. References

- (1) AMM 32-00-15/201, Landing Gear Door Locks
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-11-01/401, Auxiliary Power Unit
- (4) AMM 49-61-05/201, APU Control Unit

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 313 Stabilizer Compartment - Left
- 315 APU Compartment - Left
- 316 APU Compartment - Right
- 532 Main Tank - Left

(2) Access Panels

- 313AL Controls Access Door
- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 732AL Main Landing Gear Door - Left
- 822 Aft Cargo Door

C. Do the APU system activation for the APU compartment (Fig. 204).

S 012-024

- (1) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) While you hold the left access door in the closed position, open the four latches on the right access door.

**NOTE:** The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

EFFECTIVITY

ALL

49-11-02

01

Page 212  
Aug 22/01



- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 092-025

- (2) Remove the nylon cords attached to the APU supports.

S 492-026

- (3) Remove the nuts and washers from the cone bolts to remove the support assembly.

S 422-027

- (4) Install the APU exhaust duct as follows:

WARNING: BE CAREFUL WHEN YOU MOVE THE APU EXHAUST DUCT. THE APU EXHAUST DUCT WEIGHS APPROXIMATELY 60 POUNDS (27.3 KILOGRAMS). INJURY TO PERSONS CAN OCCUR.

CAUTION: KEEP THE INSULATION BLANKET AWAY FROM SHARP OBJECTS. YOU CAN CAUSE DAMAGE TO THE INSULATION BLANKET WITH SHARP OBJECTS.

- (a) Remove the bolts and washers that attach the plug assembly to the support ring for the APU exhaust duct.
- (b) Remove the plug assembly.
- (c) Install the six bolts and washers to the support ring.
- (d) Put the APU exhaust duct in the tail cone support and install the support saddle.

S 492-028

- (5) Install the hoist beam between the bracket on the plenum and the fuselage.

S 432-029

- (6) Remove the cap from the air supply duct.

S 432-030

- (7) Remove the cap from the air discharge duct.
  - (a) Loosen the clamp on the cap.

EFFECTIVITY

ALL

49-11-02

01

Page 213  
Dec 22/04

- (b) Move the clamp onto the air discharge duct.
- (c) Remove the cap from the air discharge duct.

S 432-031

- (8) Remove the cap from the fuel hose connector at the firewall.
  - (a) Install the fuel hose to the firewall connector.

S 432-032

- (9) Remove the caps from these connectors on the firewall: The APU harness, the starter motor, and the generator.

S 422-033

- (10) Do this task: APU Installation (AMM 49-11-01/401).

**NOTE:** Do the APU operation, the BITE procedure, and the leakage check at the end of this procedure.

- D. Do the APU system activation to the E6 Rack in the aft equipment center (Fig. 203).

S 862-049

- (1) Remove the INOP tags and collars and close these circuit breakers on the P49 APU Auxiliary Panel:
  - (a) 49C2, APU PRIME CONT
  - (b) 49C3, APU START
  - (c) 49C4, APU INLET DOOR ACT

- E. Do the APU system activation for the control cabin, the fuel shutoff valve, and the APU shutoff valve (Fig. 201 and 202).

S 442-035

- (1) Connect the electrical connector to the APU fuel shutoff valve as follows:

**WARNING:** USE THE PROCEDURE IN AMM 32-00-15/201 TO INSTALL THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (a) Open the doors for the landing gear and install the door locks (AMM 32-00-15/201).
- (b) Find the fuel shutoff valve for the APU on the dry side of the main fuel tank in the left wing.
- (c) Remove the caps from the electrical connector and from the fuel shutoff valve.
- (d) Connect the electrical connector to the fuel shutoff valve.

**WARNING:** USE THE PROCEDURE IN AMM 32-00-15/201 TO REMOVE THE DOOR LOCKS. THE DOORS OPEN AND CLOSE QUICKLY AND CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

- (e) Remove the door locks from the landing gear and close the doors (AMM 32-00-15/201).

EFFECTIVITY

ALL

49-11-02

03.1

Page 214  
Aug 22/09

S 442-036

- (2) Connect the electrical connector to the APU shutoff valve for the pneumatic system.

**WARNING:** THE CONTROLS ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT TO GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (a) Open the controls access door, 313AL.
- (b) Remove the caps from the electrical connector and from the APU shutoff valve.
- (c) Connect the electrical connector to the shutoff valve.
- (d) Close the controls access door, 313AL.

S 862-037

- (3) Remove the INOP tag from the manual reset switch for the APU generator field on the right side panel P61.

S 862-038

- (4) Remove the INOP tags on each side of the APU control switch on the overhead panel P5.

S 862-039

- (5) Remove the INOP tags from the APU generator and the APU bleed air switches on the overhead panel P5.
- (a) Put the APU GEN switch on the overhead panel P5 in the OFF position.

S 862-040

- (6) Remove the INOP tags and collars from these circuit breakers on the overhead panel P11:
- (a) 11B35, APU ALTN CONT
  - (b) 11S23, APU BLEED PWR

S 862-041

- (7) Do this task: APU Starting and Operation (AMM 49-11-00/201).

S 212-042

- (8) Examine the APU for leakage.

S 862-043

- (9) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 742-044

- (10) Do this task: APU Control Unit - BITE procedure (AMM 49-61-05/201).

EFFECTIVITY

ALL

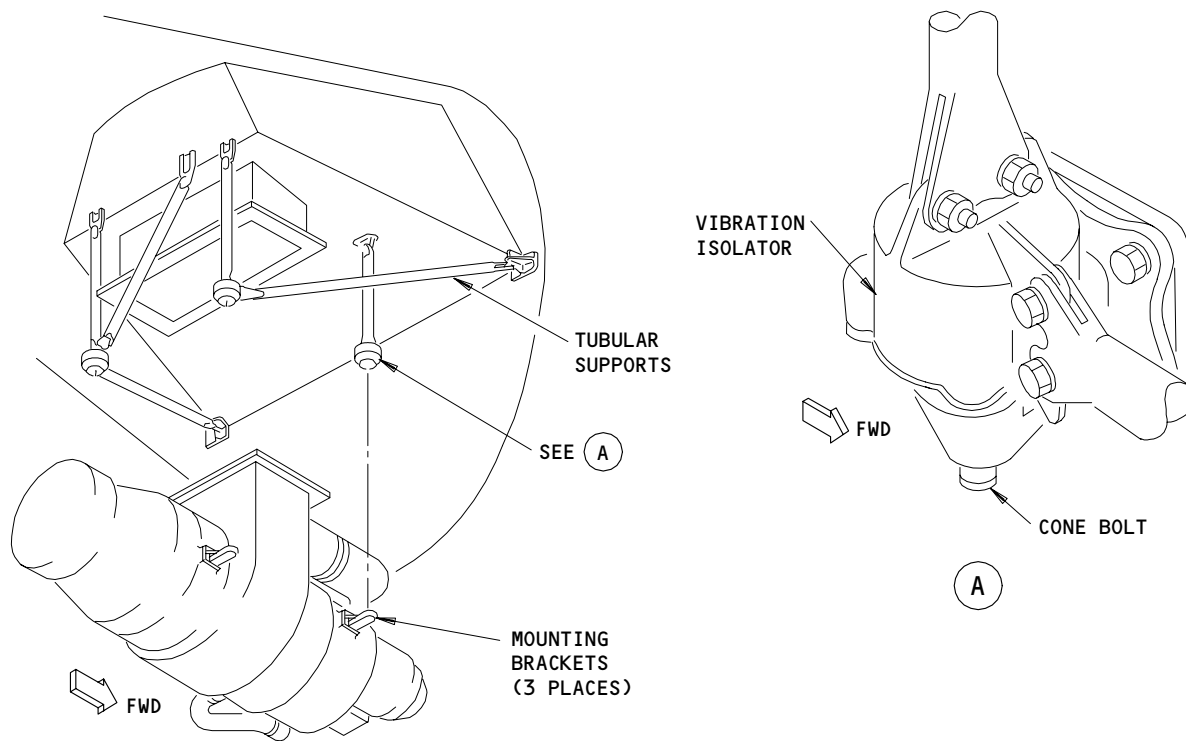
49-11-02

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Page 215  
Dec 22/04

APU MOUNTS - DESCRIPTION AND OPERATION

1. General (Fig. 1)
  - A. The APU mounts provide support and vibration isolation for the APU. The mounts attach the APU to the intake plenum. The APU is supported by one forward mount and two aft mounts. Both aft mounts support the APU vertically and axially. The left aft mount supports the APU laterally while the forward mount supports the APU vertically. The APU is provided with hoisting points used in APU removal/installation procedures.
2. Component Details
  - A. APU Support and Vibration Isolator Mounts (Shockmounts) (Fig. 1)
    - (1) The mounts consist of tubular supports, shockmounts, and brackets. The left aft shockmount is attached to fittings on the plenum through three supports making it rigid. The right aft shockmount is attached to fittings on the plenum through two supports. The supports are designed to swing laterally to the right to provide for thermal expansion of the APU and for clearance during APU removal and installation. The forward mount is attached to fittings on the plenum through one support. When the APU is installed the cone bolts are secured to APU mount brackets with nuts.

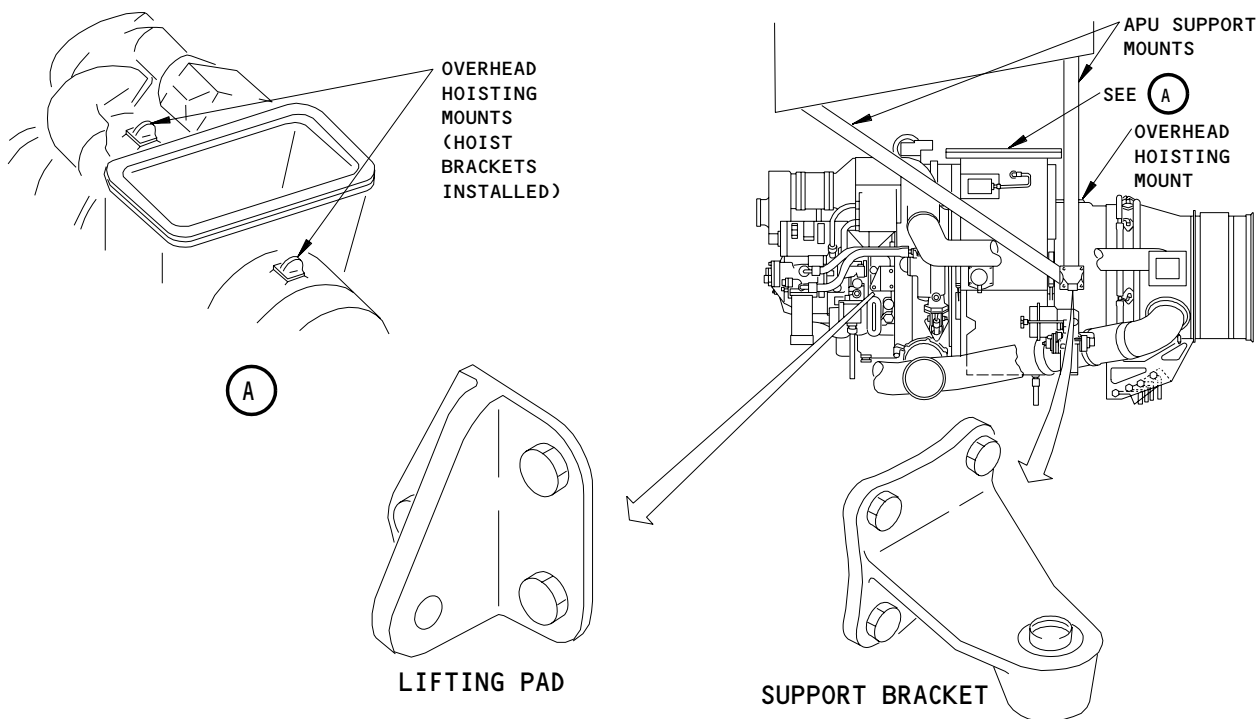


APU Shockmount Location  
Figure 1

EFFECTIVITY	
	ALL

49-13-00

- B. APU Mount Brackets (Fig. 2)
  - (1) The APU support brackets provide mounting points for the shockmount cone bolts. The APU has two support brackets on the aft side and one support bracket on the forward side. The two right hand support brackets also provide connection points for the APU cradle.
- C. Lifting Pad (Fig. 2)
  - (1) The lifting pad is installed on the APU and provides one of the three connection points for the APU cradle used during APU removal and installation.
- D. Overhead Hoisting Mounts (Fig. 2)
  - (1) Provisions for two mount pads are provided on the APU to attach a shop handling hoist.



APU Mount Bracket and Lifting Pad  
Figure 2

EFFECTIVITY	
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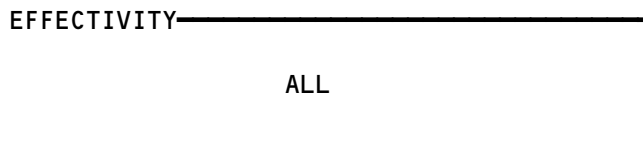
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**BOEING**  
 767  
 FAULT ISOLATION/MAINT MANUAL

APU MOUNTS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
BRACKET - APU MOUNT	--	3	316AR, 315AL, APU COMPT	49-13-03
MOUNTS - APU AFT SUPPORT AND VIBRATION ISOLATOR	--	2	316AR, 315AL, APU COMPT	49-13-02
MOUNT - APU FORWARD SUPPORT AND VIBRATION ISOLATOR	--	1	316AR, 315AL, APU COMPT	49-13-01

APU Mounts - Component Index  
Figure 101

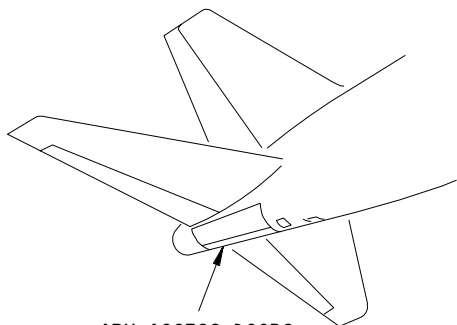


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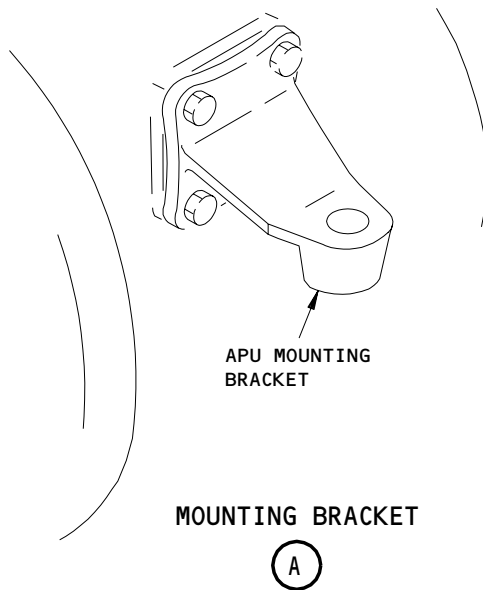
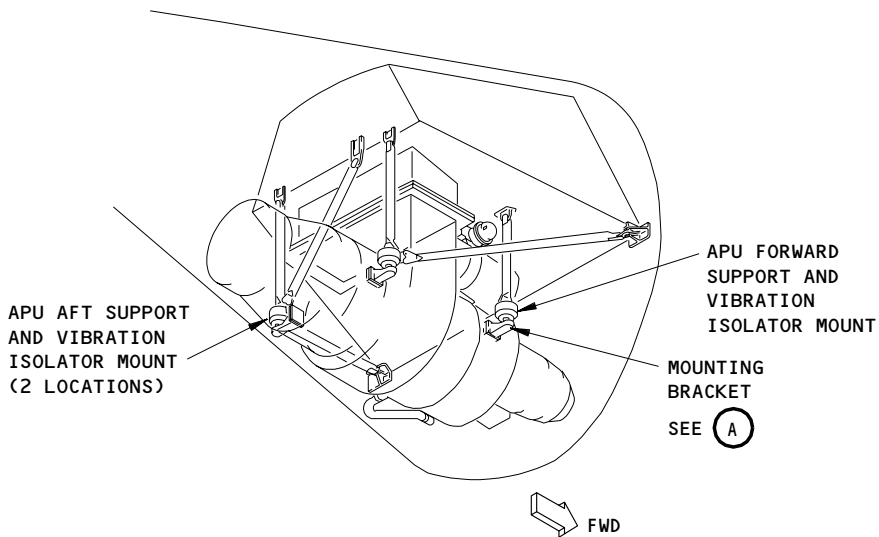
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Page 101  
Aug 10/94

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APU ACCESS DOORS,  
 315AL, 316AR



APU Mounts - Component Location  
 Figure 102

EFFECTIVITY	
	ALL

49-13-00

APU MOUNTS - INSPECTION/CHECK

1. General

- A. This procedure has the task to inspect the APU mounts.
- B. You must remove the APU to get access to the APU mounts.

TASK 49-13-00-206-001

2. APU Mounts Inspection (Fig. 601)

A. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit
- (2) AMM 49-13-01/401, APU Forward Support and Shockmount
- (3) AMM 49-13-02/401, APU Aft Support and Shockmount
- (4) AMM 49-13-03/401, APU Mounting Bracket

B. Access

(1) Location Zones

- 211 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

C. Procedure

S 016-002

- (1) Do this task: APU Removal (AMM 49-11-01/401).

S 216-003

- (2) Do these steps to examine the APU mounts:
  - (a) Visually examine these parts for corrosion, cracks and wear damage:
    - 1) APU mounting brackets
    - 2) The bolts for the APU mounting brackets
    - 3) Right forward support for the APU
    - 4) Right aft support for the APU
    - 5) Left aft support for the APU.
  - (b) If you find corrosion, cracks or wear damage, then do these steps:
    - 1) Replace the part(s) for the APU mounts that you find with corrosion or cracks.
    - 2) Replace all the parts that are more than the permitted wear limits shown in figure 601.
  - (c) If it is necessary to remove the part(s) for inspection and/or replacement, do these tasks: APU Forward Support and Shockmount Removal (AMM 49-13-01/401), APU Aft Support and Shockmount Removal (AMM 49-13-02/401) and APU Mounting Bracket Removal (AMM 49-13-03/401).

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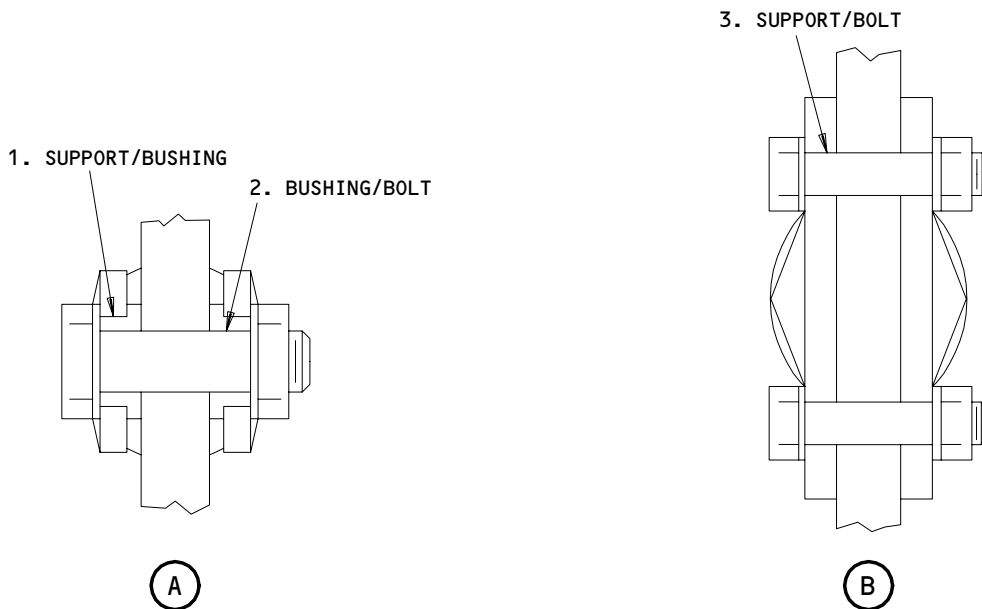
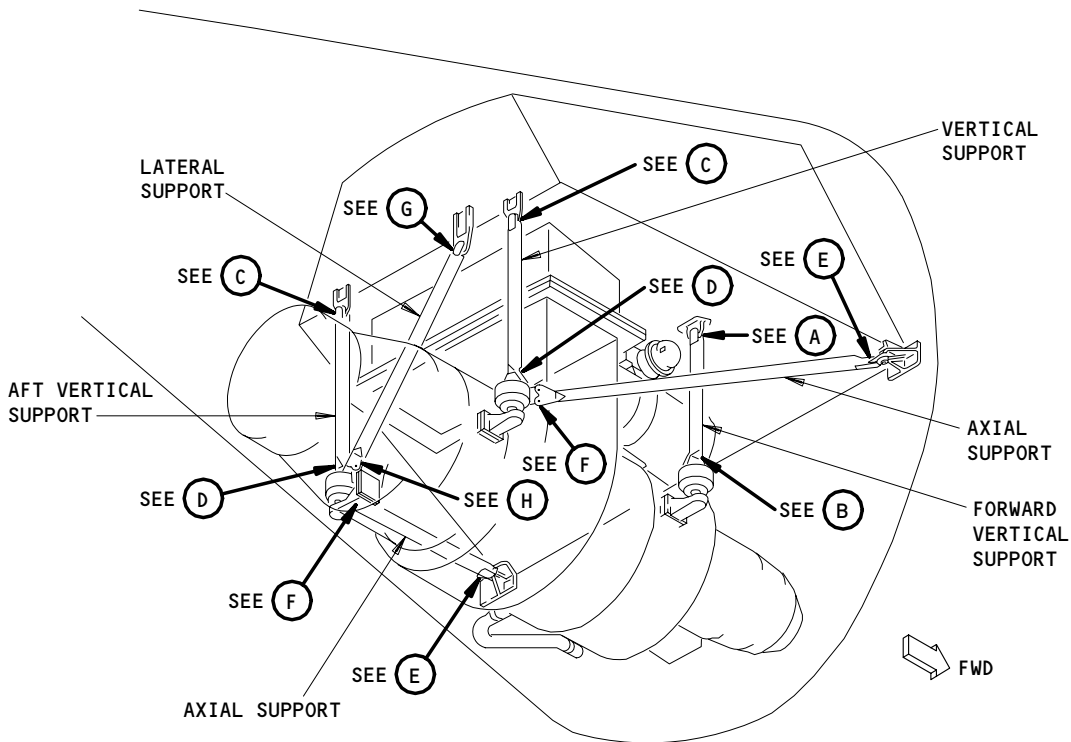
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02

Page 601  
Dec 22/05





APU Mounts Wear Limits  
Figure 601 (Sheet 1)

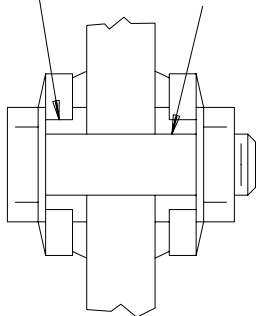
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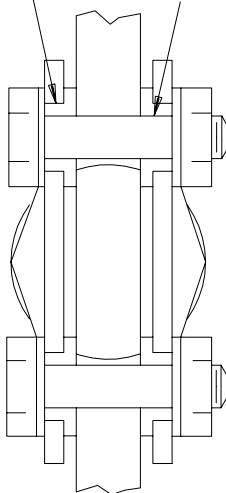
Page 602  
May 10/91

4. SUPPORT/BUSHING  
5. BUSHING/BOLT



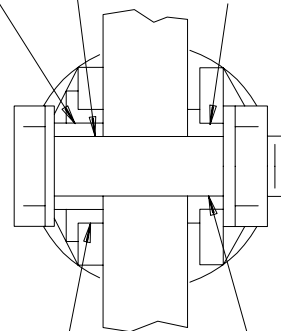
(C)

6. SUPPORT/BUSHING  
7. BUSHING/BOLT



(D)

11. BUSHING/BUSHING  
12. BUSHING/BOLT  
8. SUPPORT/BUSHING

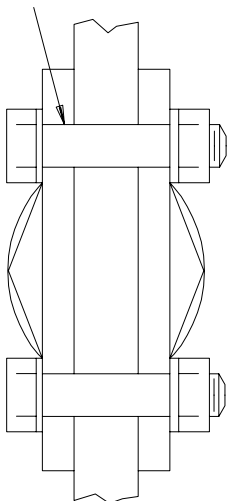


(E)

9. BUSHING/BOLT

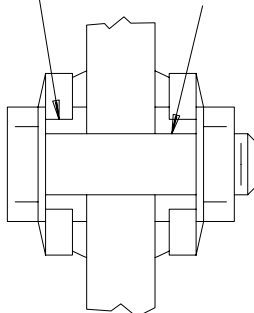
10. SUPPORT/BUSHING

13. SUPPORT/BOLT



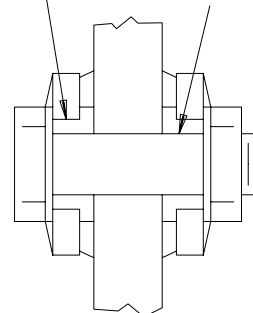
(F)

14. SUPPORT/BUSHING  
15. BUSHING/BOLT



(G)

16. SUPPORT/BUSHING  
17. BUSHING/BOLT



(H)

APU Mounts Wear Limits  
Figure 601 (Sheet 2)

EFFECTIVITY

ALL

49-13-00

01

Page 603  
May 10/91

200398

**BOEING**  
767  
MAINTENANCE MANUAL

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
			DIAMETER		MAX WEAR DIM.	MAX DIAM CLEAR-ANCE			
			MIN	MAX					
1	SUPPORT	ID	0.4375	0.4381	0.000	0.000		X	
	BUSHING	OD	0.4384	0.4390	---		X		
2	BUSHING	ID	0.3125	0.3131	0.3194	0.0141	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
3	SUPPORT	ID	0.2525	0.2540	0.2591	0.0151		X	
	BOLT	OD	0.2490	0.2495	0.2440		X		
4	SUPPORT	ID	0.4375	0.4381	0.000	0.000		X	
	BUSHING	OD	0.4384	0.4390	---		X		
5	BUSHING	ID	0.3125	0.3131	0.3203	0.0150	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
6	SUPPORT	ID	0.3750	0.3756	0.000	0.000		X	
	BUSHING	OD	0.3759	0.3765	---		X		
7	BUSHING	ID	0.2525	0.2540	0.2591	0.0151	X		
	BOLT	OD	0.2490	0.2495	0.2440		X		
8	SUPPORT	ID	0.4375	0.4381	0.000	0.000		X	
	BUSHING	OD	0.4384	0.4390	---		X		
9	BUSHING	ID	0.3125	0.3140	0.3203	0.0150	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
10	SUPPORT	ID	0.5621	0.5625	0.000	0.000		X	
	BUSHING	OD	0.5636	0.5642	---		X		
11	BUSHING	ID	0.4375	0.4382	0.4470	0.0192	X		
	BUSHING	OD	0.4365	0.4370	0.4278		X		
12	BUSHING	ID	0.3125	0.3130	0.3193	0.0140	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
13	SUPPORT	ID	0.2525	0.2540	0.2591	0.0150		X	
	BOLT	OD	0.2490	0.2495	0.2440		X		

APU Mounts Wear Limits  
Figure 601 (Sheet 3)

EFFECTIVITY

ALL

**49-13-00**

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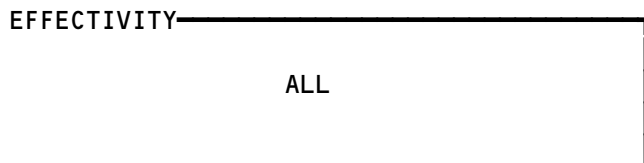
Page 604  
May 10/91

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**BOEING**  
767  
MAINTENANCE MANUAL

INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR.
			DIAMETER		ALLOWED WEAR DIM.	MAX DIAM CLEARANCE			
			MIN	MAX					
14	SUPPORT	ID	0.4375	0.4381	0.000	0.000		X	
	BUSHING	OD	0.4384	0.4390	---		X		
15	BUSHING	ID	0.3125	0.3131	0.3203	0.0150	X		
	BOLT	OD	0.3115	0.3120	0.3053		X		
16	SUPPORT	ID	0.3750	0.3756	0.000	0.000		X	
	BUSHING	OD	0.3759	0.3765	---		X		
17	BUSHING	ID	0.2500	0.2505	0.2555	0.0115	X		
	BOLT	OD	0.2490	0.2495	0.2440		X		

APU Mounts Wear Limits  
Figure 601 (Sheet 4)



49-13-00

01

Page 605  
May 10/91

200112

- (d) Visually examine the surface of each shockmount for nicks, burrs, corrosion, fretting and wear damage.
  - 1) If the individual damaged area is more than 0.50 inch (12.7 mm) in diameter and 0.20 inch (5.1 mm) in depth, replace the shockmount(s).
  - 2) If the individual damaged area is more than 1 inch (25.4 mm) in length, 0.10 inch (2.5 mm) in width and 0.20 inch (5.1 mm) in depth, replace the shockmount(s).
  - 3) If the total damaged areas are more than 15% of the total surface area of the shockmount, replace the shockmount(s).
- (e) Visually examine the surface and threads of the three cone bolts and three nuts for galling, wear and damage.
  - 1) Replace the shockmount(s) and nut(s) that you find with signs of galling.
  - 2) Replace the shockmount(s) if there is a worn area that is more than 0.002 inch (0.05 mm) below the cone bolt surface.
  - 3) Replace the shockmount(s) if you find damage on more than 25% of the cone bolt surface.
- (f) Visually examine the bolts and bushings for corrosion, wear and damage.
  - 1) Replace the bolt(s) and bushing(s) that you find with corrosion or damage.
  - 2) Replace all the parts that are more than the permitted wear limits shown in figure 601.
- (g) If the part(s) were removed for the inspection and/or replacement, then install the new or serviceable part(s). To install them, do these tasks: APU Forward Support and Shockmount Installation (AMM 49-13-01/401), APU Aft Support and Shockmount Installation (AMM 49-13-02/401) and APU Mounting Bracket Installation (AMM 49-13-03/401).
- (h) Make sure all connections for the APU mounts and support brackets are tight.

S 416-005

- (3) Do this task: APU Installation (AMM 49-11-01/401).

EFFECTIVITY

ALL

**49-13-00**

01

Page 606  
Apr 22/04

APU FORWARD SUPPORT AND SHOCKMOUNT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the forward supports and the shockmounts.
- B. The forward shockmount connects to the mounting bracket on the right side of the APU. The shockmount and the forward supports can be removed with the APU installed in the airplane. You must hold the APU with hoists or a hydraulic jack while the shockmount and the support rods are disconnected.
- C. You can get access to the APU forward supports and the shockmounts through the APU access doors.

TASK 49-13-01-004-001

2. Forward Support Removal (Fig. 401 and 402)

A. Special Tools and Equipment

- (1) APU Cradle Hoist Equip – A49001-78 or A49001-84
- (2) One set of these fishpole hoists is required:
  - (a) PF51-011 or PF51 Series Hoist – Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (b) 10/3641 Hoist – Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or
  - (c) AP6108 Hoist – Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-026

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-023

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Circuit Breaker Panel
    - 1) 11B35, APU ALTN CONT

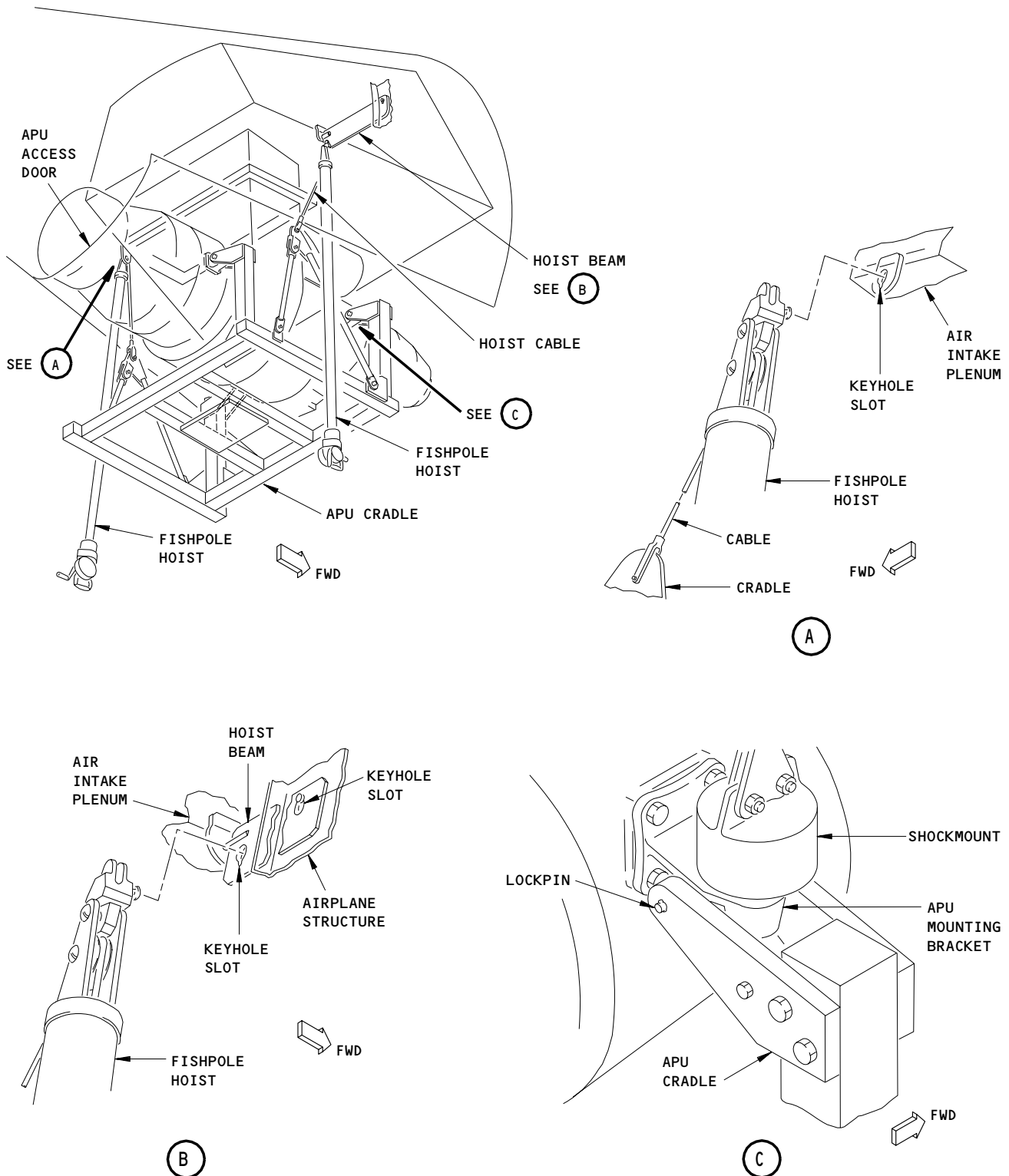
EFFECTIVITY

ALL

49-13-01

01

Page 401  
Apr 22/04



APU Forward Support and Shockmount Installation  
(Fishpole Hoist and Cradle Installation)  
Figure 401

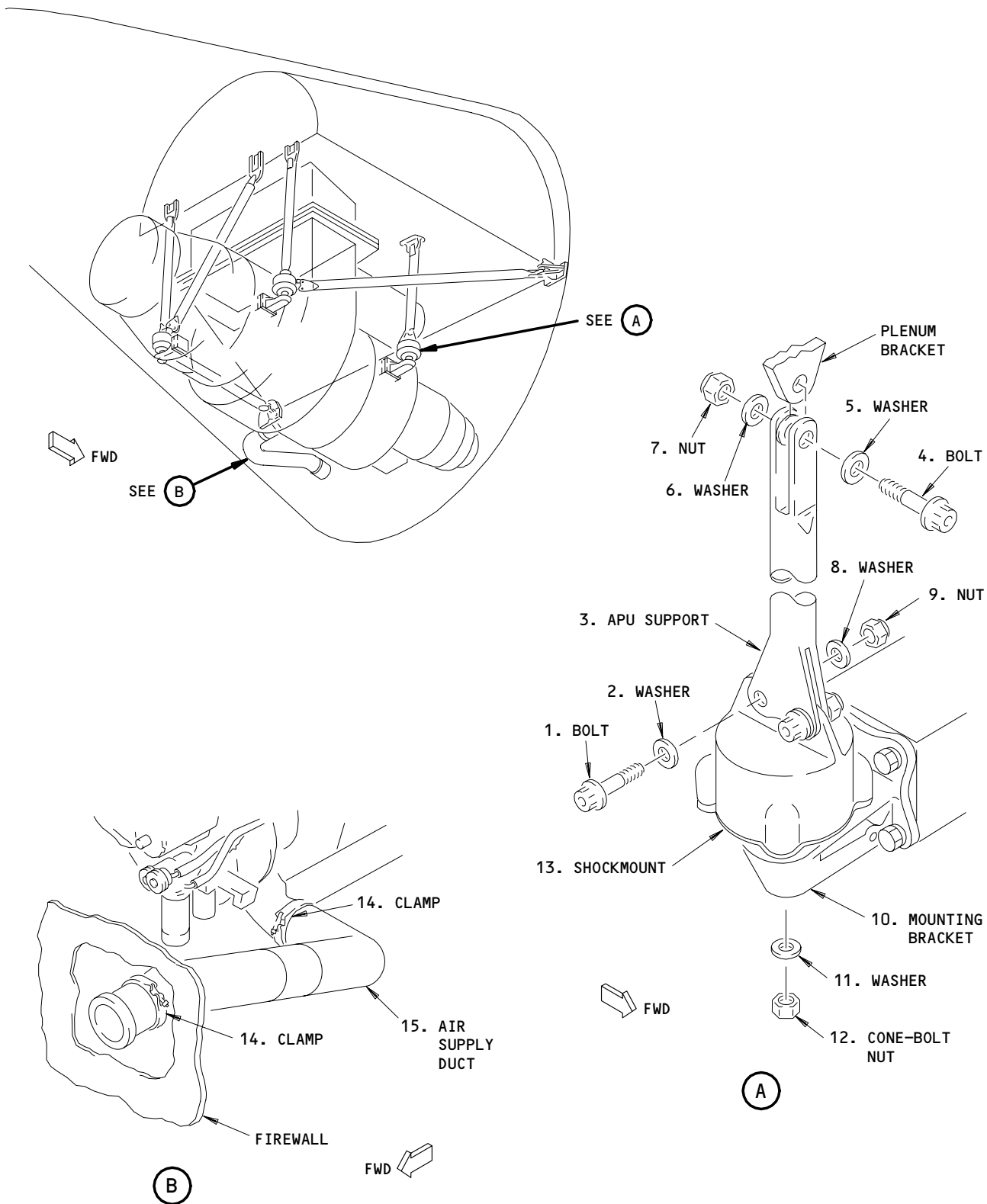
EFFECTIVITY

ALL

49-13-01

02

Page 402  
Apr 22/99



APU Forward Support and Shockmount Installation  
Figure 402

EFFECTIVITY

ALL

49-13-01

01

Page 403  
Aug 10/91



- (b) P49 Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-025

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 034-027

- (4) Disconnect the air supply duct for the APU (Fig. 402):

NOTE: The air supply duct must be disconnected to give sufficient clearance for the cradle.

- (a) Disconnect the clamp (14) that attaches the air supply duct (15) to the APU.
  - (b) Loosen the clamp (14) that attaches the air supply duct (15) to the firewall.
  - (c) Turn the air supply duct (15) away from the APU.

EFFECTIVITY

ALL

49-13-01

03

Page 404  
Aug 22/01

S 484-044

**WARNING:** MAKE SURE THE TWO FISHPOLE HOISTS ARE IN A SERVICEABLE CONDITION. THE TWO CABLES OR CHAINS OF THE TWO FISHPOLE HOISTS MUST SHOW NO SIGNS OF DAMAGE. YOU CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

**CAUTION:** FISHPOLE HOISTS WITH A CABLE AND DRUM ASSEMBLY; MAKE SURE THE TWO CABLES OF THE TWO FISHPOLE HOISTS ARE EQUALLY WOUND AROUND THE DRUM ASSEMBLY BEFORE YOU USE THE TWO FISHPOLE HOISTS TO HOLD THE APU.

(5) Install the APU hoist equipment (Fig. 401):

**NOTE:** The APU hoist equipment contains the cradle, the hoist beam, and the related hardware.

(a) Attach the hoist beam to the airplane structure and the bracket on the right aft side of the intake plenum.

**CAUTION:** MAKE SURE YOU DO THE INSPECTION OF THE KEYHOLE SLOT AREA. A DAMAGED KEYHOLE SLOT AREA CAN CAUSE INCORRECT SUPPORT OF THE APU. THIS CAN CAUSE DAMAGE TO THE APU.

(b) Visually examine the keyhole slot areas with a flashlight to make sure their condition is good.

**CAUTION:** MAKE SURE YOU CORRECTLY INSTALL THE HOISTS. AN INCORRECT INSTALLATION OF THE HOISTS IN THE SLOTS CAN CAUSE THE HOISTS TO DISENGAGE. THIS CAN CAUSE DAMAGE TO THE APU.

(c) Install the fishpole hoist in the keyhole slot on the left aft side of the intake plenum.

(d) Install the fishpole hoist in the right keyhole slot on the hoist beam.

(e) Visually make sure the fishpole hoists are correctly installed in the keyhole slots.

**NOTE:** If the fishpole hoists do not correctly install in the keyhole slots, refer to Boeing Service Letter 49-12 and SB 49-18.

(f) Attach the fishpole hoist cables or chains to the cradle.

(g) Align the cradle and the bracket attach points and lift the cradle into its position below the APU.

(h) Install the lockpins.

(i) Tighten the hoist cables or chains to hold the APU during the forward support removal.

EFFECTIVITY

ALL

49-13-01

01

Page 405  
Aug 22/01

S 024-007

- (6) Remove the forward support (Fig. 402):
  - (a) Remove the nuts (9), the washers (2 and 8), and the bolts (1) that attach the APU support (3) to the shockmount (13).
  - (b) Remove the nut (7), the washers (5 and 6), and the bolt (4) that attach the APU support (3) to the plenum bracket.
  - (c) Remove the APU support (3).

TASK 49-13-01-404-008

3. Forward Support Installation (Fig. 401 and 402)

A. Special Tools and Equipment

- (1) A49001-78 or A49001-84 - APU Cradle Hoist Equipment
- (2) One set of these fishpole hoists is required:
  - (a) PF51-011 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (b) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or
  - (c) AP6108 Hoist - Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

B. Consumable Materials

- (1) D50180 Grease - BMS 3-33 (Preferred)
- (2) D00015 Grease - BMS 3-24 (Alternate)

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
402	3	APU Support	49-13-01	01	90

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panel

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

EFFECTIVITY

ALL

49-13-01

02

Page 406  
Apr 22/08

E. Procedure

S 424-009

- (1) Install the forward support (Fig. 402):
  - (a) Lubricate the bolts (1 and 4) with the grease.
  - (b) Put the APU support (3) in its position in the APU compartment.
  - (c) Attach the APU support (3) to the shockmount (13) with the bolts (1), the washers (2 and 8) and the nuts (9).
    - 1) Tighten the nuts (9) to 85-110 inch-pounds (9.6-12.4 newton-meters).
  - (d) Attach the APU support (3) to the plenum bracket with the bolt (4), the washers (5 and 6), and the nut (7).
    - 1) Tighten the nut (7) to 85-110 inch-pounds (9.6-12.4 newton-meters).

S 094-029

- (2) Remove the APU hoist equipment (Fig. 401):
  - (a) Loosen the fishpole hoist cables.
  - (b) Remove the lockpins and the cradle.
  - (c) Remove the fishpole hoists and the hoist beam from the airplane structure.

S 434-030

- (3) Connect the air supply duct for the APU (Fig. 402):
  - (a) Put the air supply duct (15) in its position between the APU and the firewall.
  - (b) Install the clamps (14) that attach the air supply duct (15) to the firewall and the APU.
    - 1) Tighten the clamps (14) to 50-70 inch-pounds (5.7-7.9 newton-meters).

S 414-031

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-032

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-13-01

04

Page 407  
Apr 22/03

- 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-024

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

TASK 49-13-01-004-015

4. Forward Shockmount Removal (Fig. 401 and 402)

A. Special Tools and Equipment

- (1) A49001-77 or A49001-84 - APU Cradle Hoist Equipment
- (2) One set of these fishpole hoists is required:
  - (a) PF51-011 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (b) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or
  - (c) AP6108 Hoist - Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 864-033

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-034

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Circuit Breaker Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-13-01

04

Page 408  
Apr 22/04

2) 49C3, APU START

S 014-035

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 034-036

- (4) Disconnect the air supply duct for the APU (Fig. 402):

NOTE: The air supply duct must be disconnected to give sufficient clearance for the cradle.

(a) Disconnect the clamp (14) that attaches the air supply duct (15) to the APU.

(b) Loosen the clamp (14) that attaches the air supply duct (15) to the firewall.

(c) Turn the air supply duct (15) away from the APU.

S 494-037

- (5) Install the APU hoist equipment (Fig. 401):

NOTE: The APU hoist equipment contains the cradle, the hoist beam, and the related hardware.

(a) Attach the hoist beam to the airplane structure and the bracket on the right aft side of the intake plenum.

EFFECTIVITY

ALL

49-13-01

03

Page 409  
Aug 22/01

**CAUTION:** MAKE SURE YOU DO THE INSPECTION OF THE KEYHOLE SLOT AREA. A DAMAGED KEYHOLE SLOT AREA CAN CAUSE INCORRECT SUPPORT OF THE APU. THIS CAN CAUSE DAMAGE TO THE APU.

- (b) Visually examine the keyhole slot areas with a flashlight to make sure their condition is good.

**CAUTION:** MAKE SURE YOU CORRECTLY INSTALL THE HOISTS. AN INCORRECT INSTALLATION OF THE HOISTS IN THE SLOTS CAN CAUSE THE HOISTS TO DISENGAGE. THIS CAN CAUSE DAMAGE TO THE APU.

- (c) Install the fishpole hoist in the keyhole slot on the left aft side of the intake plenum.
- (d) Install the fishpole hoist in the right keyhole slot on the hoist beam.
- (e) Visually make sure the fishpole hoists are correctly installed in the keyhole slots.

**NOTE:** If the fishpole hoists do not correctly install in the keyhole slots, refer to Boeing Service Letter 49-12 and SB 49-18.

- (f) Attach the fishpole hoist cables to the cradle.
- (g) Align the cradle and the bracket attach points and lift the cradle into its position below the APU.
- (h) Install the lockpins.
- (i) Tighten the hoist cables to hold the APU during the forward support removal.

S 024-016

- (6) Remove the forward shockmount (Fig. 402):
  - (a) Remove the nuts (9), the washers (2 and 8), and the bolts (1) that attach the APU support (3) to the shockmount (13).
  - (b) Remove the cone bolt nut (12) and the washer (11).
  - (c) Lift the shockmount (13) from the mounting bracket (10).

**CAUTION:** MAKE SURE YOU USE A PAD IF YOU USE A HAMMER ON THE CONE BOLT. DAMAGE TO THE CONE BOLT THREADS CAN OCCUR.

- 1) If the cone bolt does not move freely, hit the end of the bolt with a soft hammer.

TASK 49-13-01-404-017

5. Forward Shockmount Installation (Fig. 401 and 402)

A. Special Tools and Equipment

- (1) A49001-78 or A49001-84 - APU Cradle Hoist Equipment

EFFECTIVITY

ALL

49-13-01

01

Page 410  
Aug 22/99

- (2) One set of these fishpole hoists is required:
  - (a) PF51-011 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (b) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or
  - (c) AP6108 Hoist - Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

B. Consumable Materials

- (1) D50180 Grease - BMS 3-33 (Preferred)
- (2) D00015 Grease - BMS 3-24 (Alternate)

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
402	13	Shockmount (Vibration Isolator)	49-13-01	01	50

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 414-018

- (1) Install the forward shockmount (Fig. 402):
  - (a) Install the shockmount (13) in the mounting bracket (10).
  - (b) Attach the shockmount (13) to the APU support (3) with the bolts (1), the washers (2 and 8), and the nuts (9).
    - 1) Tighten the nuts (9) to 85-110 inch-pounds (9.6-12.4 newton-meters).

EFFECTIVITY

ALL

49-13-01

02

Page 411  
Apr 22/08



- (c) Install the cone bolt nut (12) and washer (11) on the shockmount (13).
- 1) Install new cone bolt washer (11) and nut (12) or use washer and nut that had a dye penetrant inspection.
  - 2) Do the torque limit test for the nut (12):
    - a) Tighten the nut to a run-on torque of not more than 100 inch-pounds (11.3 newton-meters) until you can see one to two full threads and the cone bolt chamfer extends below each nut.
- NOTE: Use an open-end wrench on the shaft flats between the APU mounting bracket and the shockmount to hold the shaft.
- b) Make sure the washer (11) does not touch the bottom surface of the APU mounting bracket.
  - c) Make sure the break-away torque necessary to turn the nut from this position is more than 14 inch-pounds (1.6 newton-meters).
  - d) Replace the nut (12) if it is not in the specified torque limits.
  - e) If you replaced the nut (12), do the torque test again for the new nut.
- 3) Tighten the nut (12) to 475-525 inch-pounds (53.7-59.3 newton-meters).

S 094-038

- (2) Remove the APU hoist equipment (Fig. 401):
- (a) Loosen the fishpole hoist cables.
  - (b) Remove the lockpins and the cradle.
  - (c) Remove the fishpole hoists and the hoist beam from the airplane structure.

S 434-039

- (3) Connect the air supply duct for the APU (Fig. 402):
- (a) Put the air supply duct (15) in its position between the APU and the firewall.
  - (b) Install the clamps (14) that attach the air supply duct (15) to the firewall and the APU.
    - 1) Tighten the clamps (14) to 50-70 inch-pounds (5.7-7.9 newton-meters).

EFFECTIVITY

ALL

49-13-01

01

Page 412  
Aug 22/01

S 414-040

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 864-041

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 864-042

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-13-01

03

Page 413  
Aug 22/01

APU AFT SUPPORTS AND SHOCKMOUNT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the aft support rods and the shockmounts for the APU.
- B. The aft shockmounts connect to the mounting brackets on the aft sides of the APU. The left shockmount connects to an axial, a vertical, and a lateral support rod. The right shockmount connects to an axial and a vertical support rod.
- C. The support rods and the shockmounts can be removed with the APU installed in the airplane. The APU must be held with hoists during the removal of the support rods or the shockmounts.
- D. This procedure uses fishpole hoists to hold the APU during the removal and the installation tasks. Optional to the hoists, you can use a hydraulic transmission jack to hold the APU. But, it is necessary to use an adapter plate to connect the hydraulic jack to the cradle.
- E. You can get access to the aft support rods and the shockmounts through the APU access doors.

TASK 49-13-02-004-001

2. APU Aft Support Removal (Fig. 401 and 402)

A. Special Tools and Equipment

- (1) A49001-78 or A49001-84 – APU Cradle Hoist Equipment
- (2) One set of these fishpole hoists is required:
  - (a) PF51-011 or PF51 Series Hoist – Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (b) 10/3641 Hoist – Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or
  - (c) AP6108 Hoist – Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panel

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

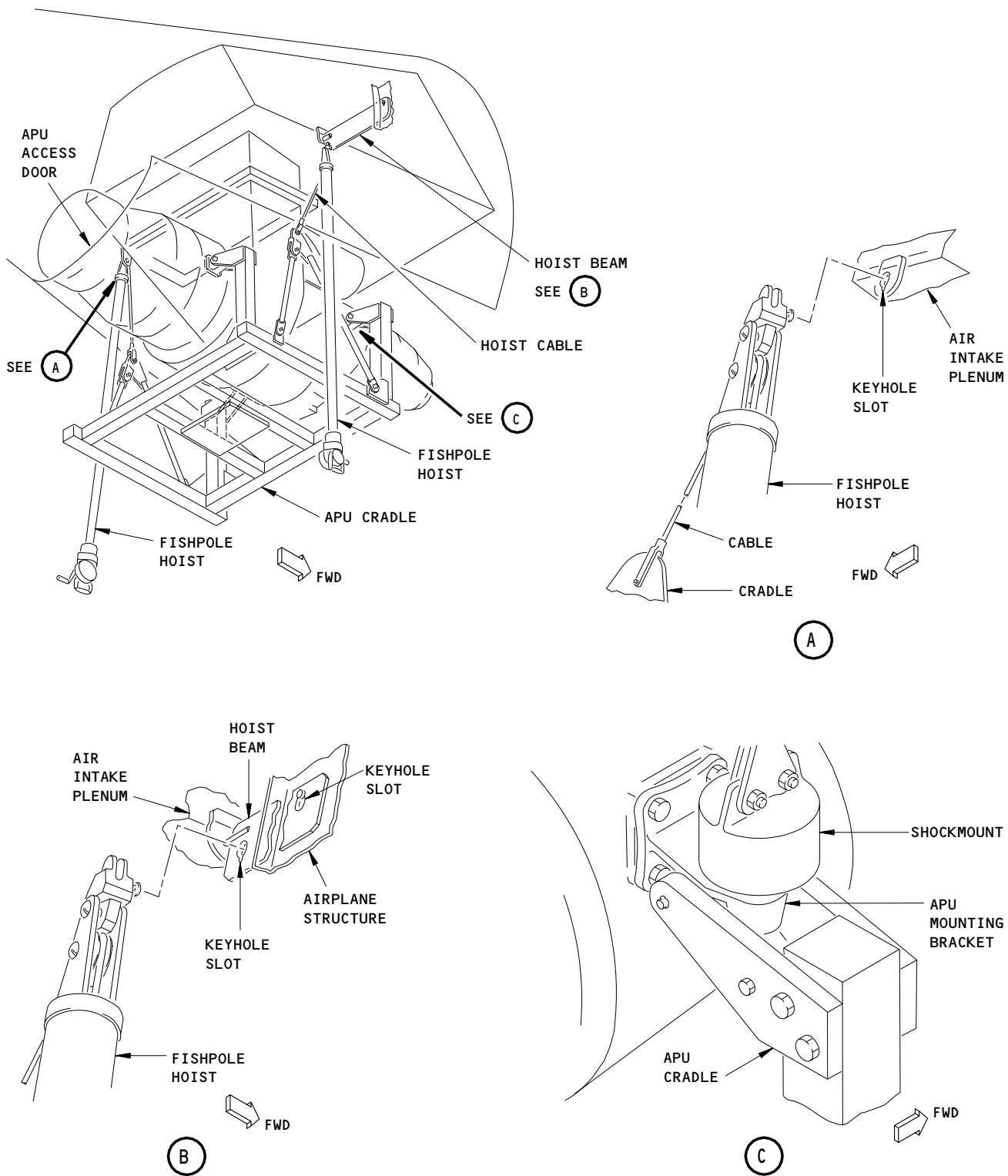
EFFECTIVITY

ALL

49-13-02

01

Page 401  
Apr 22/04



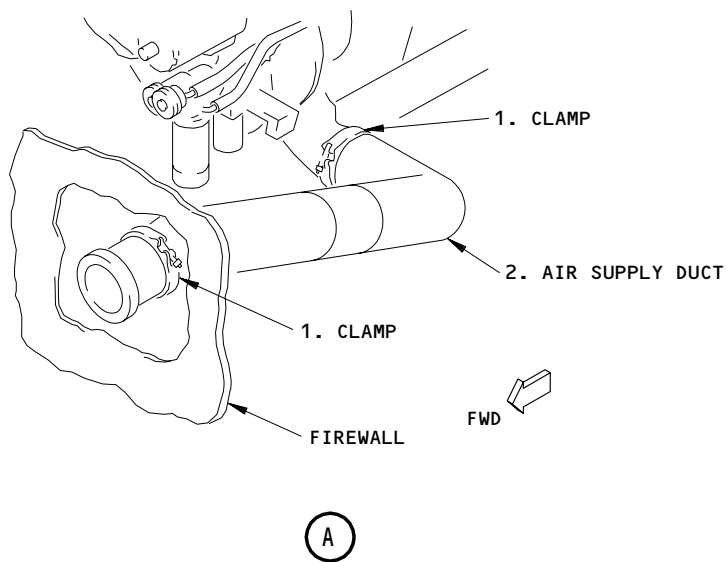
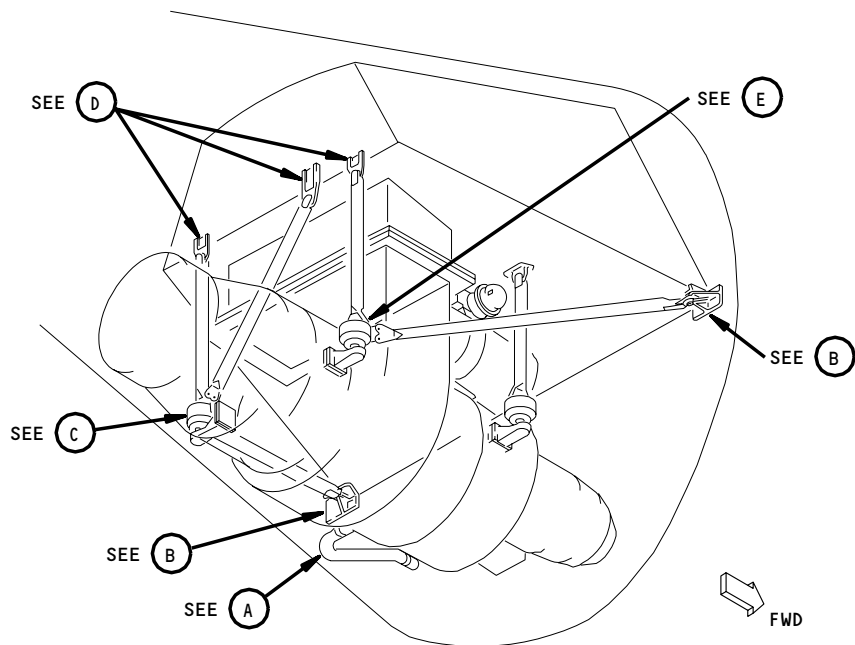
APU Aft Supports and Shockmount Installation  
(Fishpole Hoist and Cradle Installation)  
Figure 401

EFFECTIVITY	
	ALL

49-13-02

02

Page 402  
Apr 22/99



APU Aft Supports and Shockmount Installation  
Figure 402 (Sheet 1)

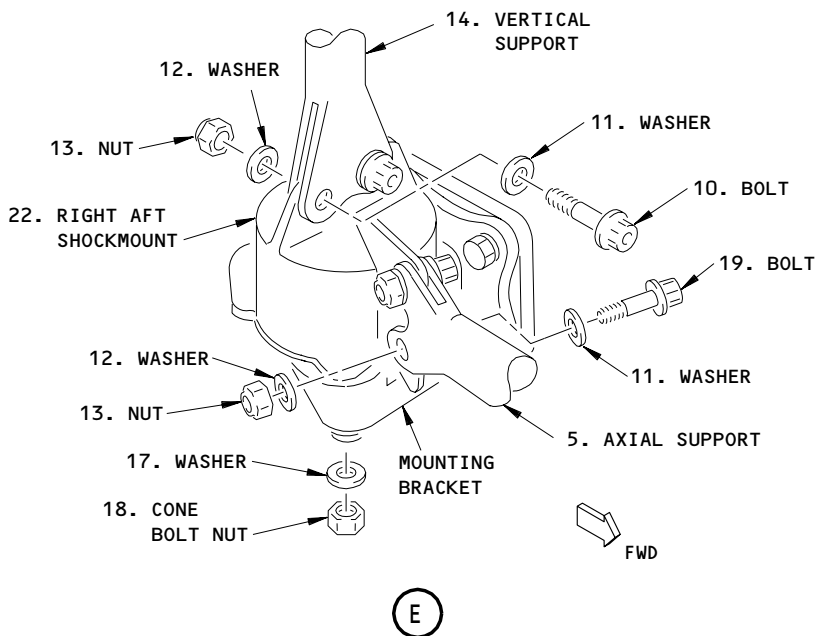
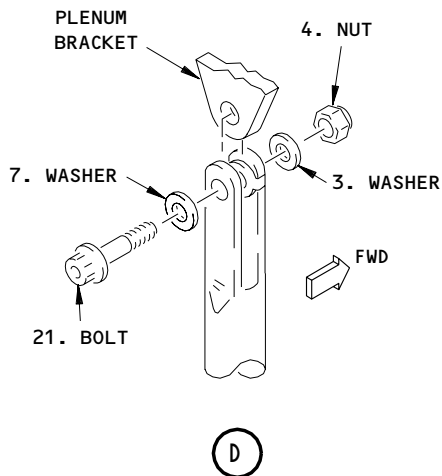
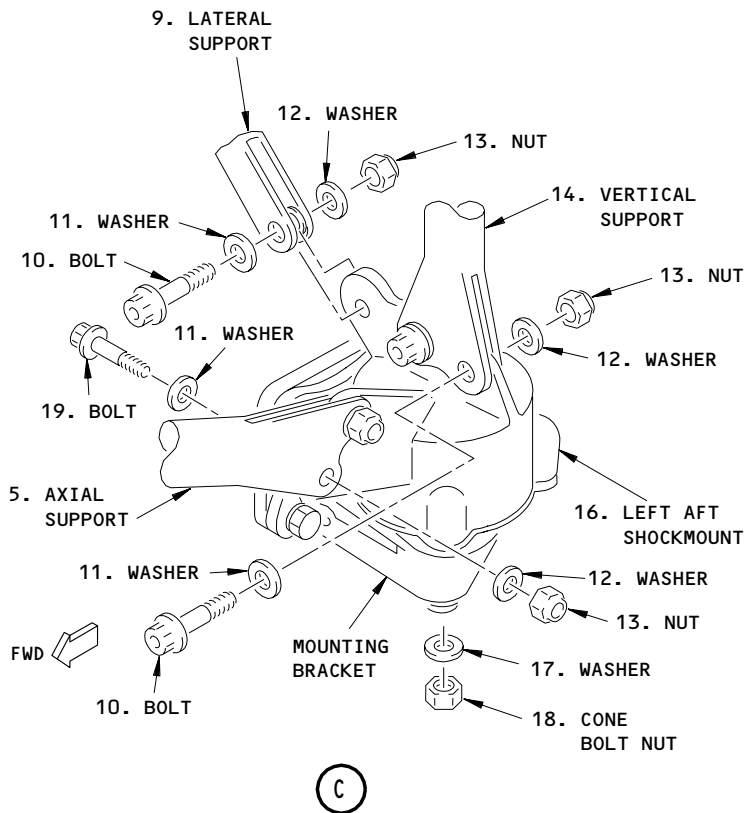
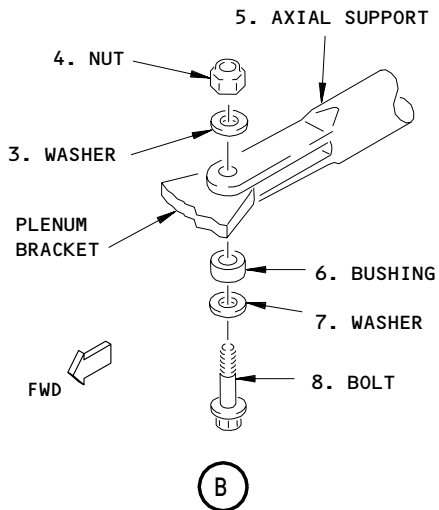
EFFECTIVITY	
ALL	

49-13-02

02

Page 403  
Apr 22/99

7833



APU Aft Supports and Shockmount Installation  
Figure 402 (Sheet 2)

EFFECTIVITY

ALL

49-13-02

02

Page 404  
Apr 22/99

C. Procedure

S 864-013

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-014

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Circuit Breaker Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 014-015

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 034-016

- (4) Disconnect the air supply duct for the APU (Fig. 402):

NOTE: The air supply duct must be disconnected to give sufficient clearance for the cradle.

- (a) Disconnect the clamp (1) that attaches the air supply duct (2) to the APU.
- (b) Loosen the clamp (1) that attaches the air supply duct (2) to the firewall.
- (c) Turn the air supply duct (2) away from the APU.

EFFECTIVITY

ALL

49-13-02

06

Page 405  
Apr 22/04

S 484-034

**WARNING:** MAKE SURE THE TWO FISHPOLE HOISTS ARE IN A SERVICEABLE CONDITION. THE TWO CABLES OR CHAINS OF THE TWO FISHPOLE HOISTS MUST SHOW NO SIGNS OF DAMAGE. YOU CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

**CAUTION:** FISHPOLE HOISTS WITH A CABLE AND DRUM ASSEMBLY; MAKE SURE THE TWO CABLES OF THE TWO FISHPOLE HOISTS ARE EQUALLY WOUND AROUND THE DRUM ASSEMBLY BEFORE YOU USE THE TWO FISHPOLE HOISTS TO HOLD THE APU.

(5) Install the APU hoist equipment (Fig. 401):

**NOTE:** The APU hoist equipment contains the cradle, the hoist beam, and the related hardware.

(a) Attach the hoist beam to the airplane structure and the bracket on the right aft side of the intake plenum.

**CAUTION:** MAKE SURE YOU DO THE INSPECTION OF THE KEYHOLE SLOT AREA. A DAMAGED KEYHOLE SLOT AREA CAN CAUSE INCORRECT SUPPORT OF THE APU. THIS CAN CAUSE DAMAGE TO THE APU.

(b) Visually examine the keyhole slot areas with a flashlight to make sure their condition is good.

**CAUTION:** MAKE SURE YOU CORRECTLY INSTALL THE HOISTS. AN INCORRECT INSTALLATION OF THE HOISTS IN THE SLOTS CAN CAUSE THE HOISTS TO DISENGAGE. THIS CAN CAUSE DAMAGE TO THE APU.

(c) Install the fishpole hoist in the keyhole slot on the left aft side of the intake plenum.

(d) Install the fishpole hoist in the right keyhole slot on the hoist beam.

(e) Visually make sure the fishpole hoists are correctly installed in the keyhole slots.

**NOTE:** If the fishpole hoists do not correctly install in the keyhole slots, refer to Boeing Service Letter 49-12 and SB 49-18.

(f) Attach the fishpole hoist cables or chains to the cradle.

(g) Align the cradle and the bracket attach points and lift the cradle into its position below the APU.

(h) Install the lockpins.

(i) Tighten the hoist cables or chains to hold the APU during the forward support removal.

EFFECTIVITY

ALL

49-13-02

01

Page 406  
Aug 22/01



S 024-002

- (6) Remove the aft supports (Fig. 402):
- (a) Remove the bolts (10), the washers (11 and 12), and the nuts (13) that attach the vertical support (14) to the shockmount (16 or 22).
  - (b) Remove the bolts (19), the washers (11 and 12), and the nuts (13) that attach the axial support (5) to the shockmount (16 or 22).
  - (c) On the left shockmount (16), remove the bolt (10), the washers (11 and 12), and the nut (13) that attach the lateral support (9) to the shockmount.
  - (d) Remove the bolt (8), the washers (3 and 7), the bushing (6), and the nut (4) that attach the axial support (5) to the plenum bracket.
  - (e) Remove the bolt (21), the washers (3 and 7), and the nut (4) that attach the vertical support (14) to the plenum bracket.
  - (f) On the left shockmount (16), remove the bolt (21), the washers (3 and 7), and the nut (4) that attach the lateral support (9) to the plenum bracket.
  - (g) Remove the vertical support (14), the axial support (5), and the lateral support (9) (left side only).

TASK 49-13-02-404-003

3. APU Aft Support Installation (Fig. 401 and 402)

A. Special Tools and Equipment

- (1) A49001-78 or A49001-84 - APU Cradle Hoist Equipment
- (2) One set of these fishpole hoists is required:
  - (a) PF51-011 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (b) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or
  - (c) AP6108 Hoist - Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

B. Consumable Materials

- (1) D50180 Grease - BMS 3-33 (Preferred)
- (2) D00015 Grease - BMS 3-24 (Alternate)

EFFECTIVITY

ALL

49-13-02

02

Page 407  
Apr 22/08

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
402	5	Axial Support	49-13-01	01	125
	9	Lateral Support			145
	14	Vertical Support			105

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-004

(1) Install the aft supports (Fig. 402):

- (a) Lubricate the bolts (8, 10, 19, and 21) and the bushing (6) with the grease.
- (b) Attach the axial support (5) to the plenum bracket with the bolt (8), the washers (3 and 7), the bushing (6), and the nut (4).

**NOTE:** You must install the bolt and the bushing from the bottom side of the support.

- (c) Attach the vertical support (14) to the plenum bracket with the bolt (21), the washers (3 and 7), and the nut (4).
- (d) On the left shockmount (16), attach the lateral support (9) to the plenum bracket with the bolt (21), the washers (3 and 7), and the nut (4).
  - 1) Tighten all the nuts (4) to 165-225 inch-pounds (18.6-25.4 newton-meters).
- (e) Attach the axial support (5) to the shockmount (16 or 22) with the bolts (19), the washers (11 and 12), and the nuts (13).
- (f) Attach the vertical support (14) to the shockmount (16 or 22) with the bolts (10), the washers (11 and 12), and the nuts (13).

EFFECTIVITY

ALL

49-13-02

03

Page 408  
Apr 22/08

- (g) On the left shockmount (16), attach the lateral support (9) to the shockmount with the bolt (10), the washers (11 and 12), and the nut (13).
  - 1) Tighten all the nuts (13) to 85-110 inch-pounds (9.6-12.4 newton-meters).

S 094-018

- (2) Remove the APU hoist equipment (Fig. 401):
  - (a) Loosen the fishpole hoist cables.
  - (b) Remove the lockpins and the cradle.
  - (c) Remove the fishpole hoists and the hoist beam from the airplane structure.

S 434-019

- (3) Connect the air supply duct for the APU (Fig. 402):
  - (a) Put the air supply duct (2) in its position between the APU and the firewall.
  - (b) Install the clamps (1) that attach the air supply duct (2) to the firewall and the APU.
    - 1) Tighten the clamps (1) to 50-70 inch-pounds (5.7-7.9 newton-meters).

S 414-020

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-021

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-13-02

07

Page 409  
Apr 22/08

- 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-022

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

TASK 49-13-02-004-005

4. Aft Shockmount Removal (Fig. 401 and 402)

A. Special Tools and Equipment

- (1) A49001-78 or A49001-84 - APU Cradle Hoist Equipment
- (2) One set of these fishpole hoists is required:
  - (a) PF51-011 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (b) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or
  - (c) AP6108 Hoist - Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 864-028

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-029

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Circuit Breaker Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-13-02

03

Page 410  
Apr 22/04

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-030

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 034-031

- (4) Disconnect the air supply duct for the APU (Fig. 402):

NOTE: The air supply duct must be disconnected to give sufficient clearance for the cradle.

- (a) Disconnect the clamp (1) that attaches the air supply duct (2) to the APU.
- (b) Loosen the clamp (1) that attaches the air supply duct (2) to the firewall.
- (c) Turn the air supply duct (2) away from the APU.

S 494-032

- (5) Install the APU hoist equipment (Fig. 401):

NOTE: The APU hoist equipment contains the cradle, the hoist beam, and the related hardware.

- (a) Attach the hoist beam to the airplane structure and the bracket on the right aft side of the intake plenum.

EFFECTIVITY

ALL

49-13-02

04

Page 411  
Aug 22/01

**CAUTION:** MAKE SURE YOU DO THE INSPECTION OF THE KEYHOLE SLOT AREA. A DAMAGED KEYHOLE SLOT AREA CAN CAUSE INCORRECT SUPPORT OF THE APU. THIS CAN CAUSE DAMAGE TO THE APU.

- (b) Visually examine the keyhole slot areas with a flashlight to make sure their condition is good.

**CAUTION:** MAKE SURE YOU CORRECTLY INSTALL THE HOISTS. AN INCORRECT INSTALLATION OF THE HOISTS IN THE SLOTS CAN CAUSE THE HOISTS TO DISENGAGE. THIS CAN CAUSE DAMAGE TO THE APU.

- (c) Install the fishpole hoist in the keyhole slot on the left aft side of the intake plenum.
- (d) Install the fishpole hoist in the right keyhole slot on the hoist beam.
- (e) Visually make sure the fishpole hoists are correctly installed in the keyhole slots.

**NOTE:** If the fishpole hoists do not correctly install in the keyhole slots, refer to Boeing Service Letter 49-12 and SB 49-18.

- (f) Attach the fishpole hoist cables to the cradle.
- (g) Align the cradle and the bracket attach points and lift the cradle into its position below the APU.
- (h) Install the lockpins.
- (i) Tighten the hoist cables to hold the APU during the forward support removal.

S 024-006

- (6) Remove the aft shockmounts (Fig. 402):
  - (a) Remove the bolts (10), the washers (11 and 12), and the nuts (13) that attach the vertical support (14) to the shockmount (16 or 22).
  - (b) Remove the bolts (19), the washers (11 and 12), and the nuts (13) that attach the axial support (5) to the shockmount (16 or 22).
  - (c) On the left shockmount (16), remove the bolt (10), the washers (11 and 12), and the nut (13) that attach the lateral support (9) to the shockmount.
  - (d) Remove the cone bolt nut (18) and the washer (17).

**CAUTION:** USE A RUBBER MALLETT OR A COVER WHEN YOU HIT THE CONE BOLT. DAMAGE TO THE CONE BOLT CAN OCCUR.

- (e) If the shockmount does not move freely, hit the end of the cone bolt with a soft hammer.
- (f) Remove the shockmount (16 or 22) from the mounting bracket.

EFFECTIVITY

ALL

49-13-02

01

Page 412  
Apr 22/01

TASK 49-13-02-404-007

5. Aft Shockmount Installation (Fig. 401 and 402)

A. Special Tools and Equipment

- (1) A49001-78 or A49001-84 - APU Cradle Hoist Equipment
- (2) One set of these fishpole hoists is required:
  - (a) PF51-011 or PF51 Series Hoist - Fishpole, Manual Powered or Air-Driven Powered (500 Pound Capacity) (Quantity of 2)  
06714 P. F. Industries Inc.  
151 S. Michigan St., Seattle, WA 98108-3225 or
  - (b) 10/3641 Hoist - Fishpole, Manual Powered (Quantity of 2)  
Didsbury Engineering Co. Ltd,  
Manor Road, Levenshulme, Manchester M19 3EJ or
  - (c) AP6108 Hoist - Fishpole, Advanced Chain-Driven (Quantity of 2)  
Morgan Aero Products  
2719 Pacific Avenue, Everett, WA 98201

B. Consumable Materials

- (1) D50180 Grease - BMS 3-33 (Preferred)
- (2) D00015 Grease - Water Resistant, BMS 3-24 (Alternate)

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
402	16	Left Aft Shockmount (Vibration Isolator)	49-13-01	01	40
	22	Right Aft Shockmount (Vibration Isolator)			45

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

EFFECTIVITY

ALL

49-13-02

04

Page 413  
Apr 22/08

E. Procedure

S 424-008

- (1) Install the aft shockmounts (Fig. 402):
  - (a) Lubricate the bolts (10 and 19) with the grease.
  - (b) Install the shockmount (16 or 22) in the mounting bracket.
  - (c) Attach the axial support (5) to the shockmount (16 or 22) with the bolts (19), the washers (11 and 12), and the nuts (13).
  - (d) Attach the vertical support (14) to the shockmount (16 or 22) with the bolts (15), the washers (11 and 12), and the nuts (13).
  - (e) On the left shockmount (16), attach the lateral support (9) to the shockmount with the bolt (10), the washers (11 and 12), and the nut (13).
    - 1) Tighten all the nuts (13) to 85-110 inch-pounds (9.6-12.4 newton-meters).
  - (f) Install the cone bolt nut (18) and washer (17) on the shockmount (16 or 22).
    - 1) Install new cone bolt washer (17) and nut (18) or use washer and nut that had a dye penetrant inspection.
    - 2) Do the torque limit test for the nut (18):
      - a) Tighten the nut to a run-on torque of not more than 100 inch-pounds (11.3 newton-meters) until you can see one to two full threads and the cone bolt chamfer extends below each nut.

NOTE: Use an open-end wrench on the shaft flats between the APU mounting bracket and the shockmount to hold the shaft.

- b) Make sure the washer (17) does not touch the bottom surface of the APU mounting bracket.
- c) Make sure the break-away torque necessary to turn the nut from this position is more than 14 inch-pounds (1.6 newton-meters).
- d) Replace the nut (18) if it is not in the specified torque limits.
- e) If you replaced the nut (18), do the torque test again for the new nut.
- 3) Tighten the nut (18) to 475-525 inch-pounds (53.7-59.3 newton-meters).

NOTE: The cone bolt shaft has flat sides for a wrench. You can use a wrench to hold the cone bolt while you tighten the nut.

EFFECTIVITY

ALL

49-13-02

01

Page 414  
Aug 22/01



S 094-023

- (2) Remove the APU hoist equipment (Fig. 401):
- (a) Loosen the fishpole hoist cables.
  - (b) Remove the lockpins and the cradle.
  - (c) Remove the fishpole hoists and the hoist beam from the airplane structure.

S 434-024

- (3) Connect the air supply duct for the APU (Fig. 402):
- (a) Put the air supply duct (2) in its position between the APU and the firewall.
  - (b) Install the clamps (1) that attach the air supply duct (2) to the firewall and the APU.
    - 1) Tighten the clamps (1) to 50-70 inch-pounds (5.7-7.9 newton-meters).

S 414-025

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-026

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-13-02

03

Page 415  
Aug 22/01

 **BOEING**  
767  
MAINTENANCE MANUAL

- 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-027

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-13-02

02

Page 416  
Aug 22/01

APU MOUNTING BRACKET – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the APU mounting brackets. The mounting brackets are the mating surfaces for the cone bolts on the APU shockmounts.
- B. There are two mounting brackets on the right side of the APU and one mounting bracket on the left side.
- C. You can remove the left mounting bracket with the APU in the airplane. You must remove the APU to remove the right mounting bracket(s).
- D. You can get access to the APU mounting brackets through the APU access doors.

TASK 49-13-03-004-001

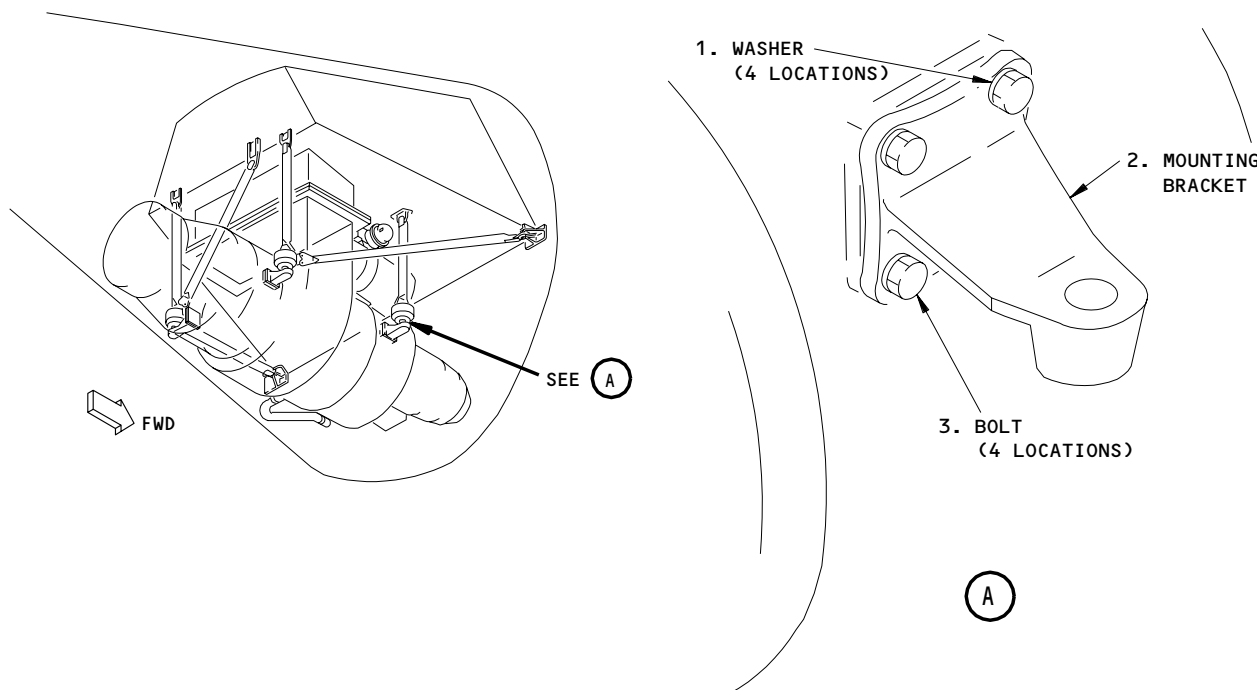
2. Mounting Bracket Removal (Fig. 401)

A. Special Tools and Equipment

- (1) A49005-1 Sling – APU

B. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit
- (2) AMM 49-13-02/401, APU Aft Supports and Shockmounts



APU Mounting Bracket Installation  
Figure 401

EFFECTIVITY

ALL

**49-13-03**

01

Page 401  
Aug 22/01

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 024-002

- (1) Remove the aft left mounting bracket:
- (a) Remove the left aft shockmount (AMM 49-13-02/401).
  - (b) Remove the bolts (3) and the washers (1) that attach the mounting bracket (2) to the APU.
  - (c) Remove the mounting bracket (2) from the APU.

S 024-003

- (2) Remove the mounting bracket(s) on the right side of the APU:
- (a) Remove the APU and put it on a transportation dolly (AMM 49-11-01/401).
  - (b) Install the APU sling to hold the APU during the mounting bracket removal.
  - (c) Hold the APU with the APU sling.
  - (d) Disconnect the APU cradle from the mounting brackets.
  - (e) Remove the bolts (3) and the washers (1) that attach the mounting bracket(s) (2) to the APU.
  - (f) Remove the mounting bracket(s) (2) from the APU.

TASK 49-13-03-404-004

3. Mounting Bracket Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Mounting Bracket	49-11-00	01	105

B. References

- (1) AMM 49-11-01/401, Auxiliary Power Unit
- (2) AMM 49-13-00/601, APU Mounts
- (3) AMM 49-13-02/401, APU Aft Supports and Shockmounts

EFFECTIVITY

ALL

**49-13-03**

01

Page 402  
Aug 22/05

C. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

D. Procedure

S 224-006

- (1) Do an inspection of the applicable APU shockmount(s) (AMM 49-13-00/601).

S 424-005

- (2) Install the left aft mounting bracket:
- (a) Install the mounting bracket (2) on the APU with the washers (1) and the bolts (3).
    - 1) Tighten the bolts (3) to 252-300 inch-pounds (28.5-33.9 newton-meters).
    - 2) Safety the bolts with wire.
  - (b) Install the aft left shockmount (AMM 49-13-02/401).

S 424-007

- (3) Install the mounting bracket(s) on the right side of the APU:
- (a) Attach the mounting bracket(s) (2) to the APU with the washers (1) and the bolts (3).
    - 1) Tighten the bolts (3) to 252-300 inch-pounds (28.5-33.9 newton-meters).
    - 2) Safety the bolts with wire.
  - (b) Lower the APU on the transportation dolly.
  - (c) Remove the APU sling.
  - (d) Attach the cradle to the APU.
  - (e) Do this task: APU Installation (AMM 49-11-01/401).

EFFECTIVITY

ALL

49-13-03

01

Page 403  
Aug 22/01

APU HARNESS – INSPECTION/CHECK

1. General

- A. This procedure contains the task to an inspection of the APU wire harness.
- B. The APU wire harness supplies power and transmits signals for these APU engine components:
  - (1) The fuel control unit
  - (2) The fuel flow divider
  - (3) The ignition unit
  - (4) The switch for the isolation valve for the cooling fan
  - (5) The oil quantity transmitter
  - (6) The total pressure transducer
  - (7) The differential pressure transducer
  - (8) The sensor for the compressor inlet temperature
  - (9) The inlet pressure sensor
  - (10) The oil temperature sensor
  - (11) The IGV actuator
  - (12) The surge valve
  - (13) The EGT thermocouple.
- C. The removal of the wire harness is not recommended unless you find damage during this inspection that you cannot repair. You can get access to the APU wire harness through the APU access doors.

TASK 49-14-00-206-001

2. Wire Harness Inspection

- A. References
  - (1) SWPM 20-10-13/101, Repair of Electrical Wire and Cable.
  - (2) SWPM 20-60-00/101, Standard Connector Processes
- B. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door

EFFECTIVITY

ALL

49-14-00

04

Page 601  
Dec 22/08

C. Procedure

S 866-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Circuit Breaker Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 016-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) While you hold the left access door in the closed position, open the four latches on the right access door.  
  

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.
  - (b) Open the left access door to the fully open position and manually lock the hold-open strut.  
  

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.
  - (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.  
  

NOTE: The location of the detent latch is at the forward end of the right access door.
  - (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-005

- (4) Visually examine the APU wire harness:
- (a) Visually examine the wire harness for damaged insulation, wires that are broken, and corrosion on the terminals.
    - 1) Repair any damaged insulation, wires that are broken, and corrosion on the terminals (SWPM 20-10-13/101).
  - (b) Visually examine the plugs and the connectors for damaged contacts, pins that are broken or bent, and damaged threads.
    - 1) Repair any plugs and the connectors with damaged contacts, pins that are broken or bent, and damaged threads (SWPM 20-60-00/101).

EFFECTIVITY

ALL

49-14-00

04

Page 602  
Dec 22/08

S 416-006

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 866-007

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Circuit Breaker Panel

1) 11B35, APU ALTN CONT

S 866-008

- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-14-00

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Page 603  
Aug 22/01



AIR INTAKE SYSTEM - DESCRIPTION AND OPERATION

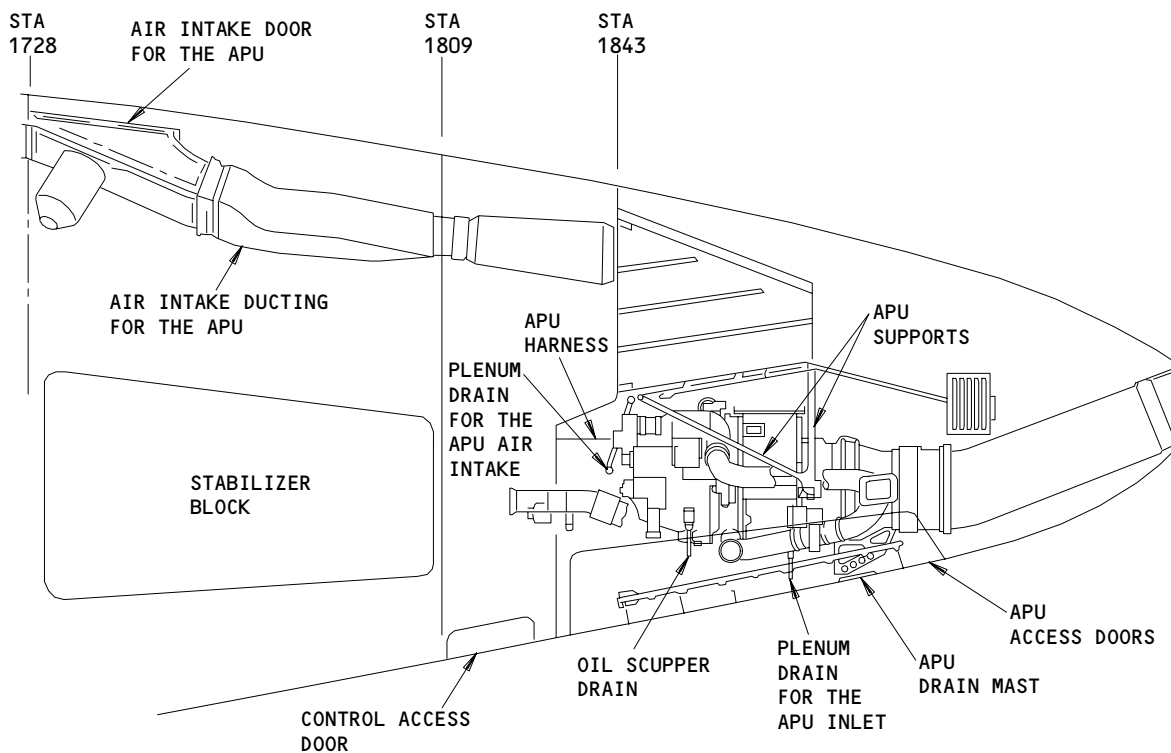
1. General (Fig. 1)

A. The air intake system of the APU provides control and passage of air from the exterior of the airplane to the inlet plenum for the APU compressor. The intake door and seal, intake port, intake door actuator, and intake ducts are located forward of the APU firewall on the right side above the horizontal stabilizer. The air intake plenum is mounted on the aft side of the APU firewall and serves as the major support of the APU. The intake door actuator opens the door outward to draw air through the ducts and plenum and into the inlet plenum for the APU compressor. The actuator is powered by the APU battery bus with 28 volts dc.

2. Component Details

A. Air Intake Port (Fig. 2)

(1) The air intake port houses the intake door and actuator and provides a passage for air to the ducts. It is bolted to the outer skin of the airplane between the vertical and right horizontal stabilizers. The port is a composite of graphite-kevlar-fiberglass material.



APU Air Intake System Location  
Figure 1

EFFECTIVITY

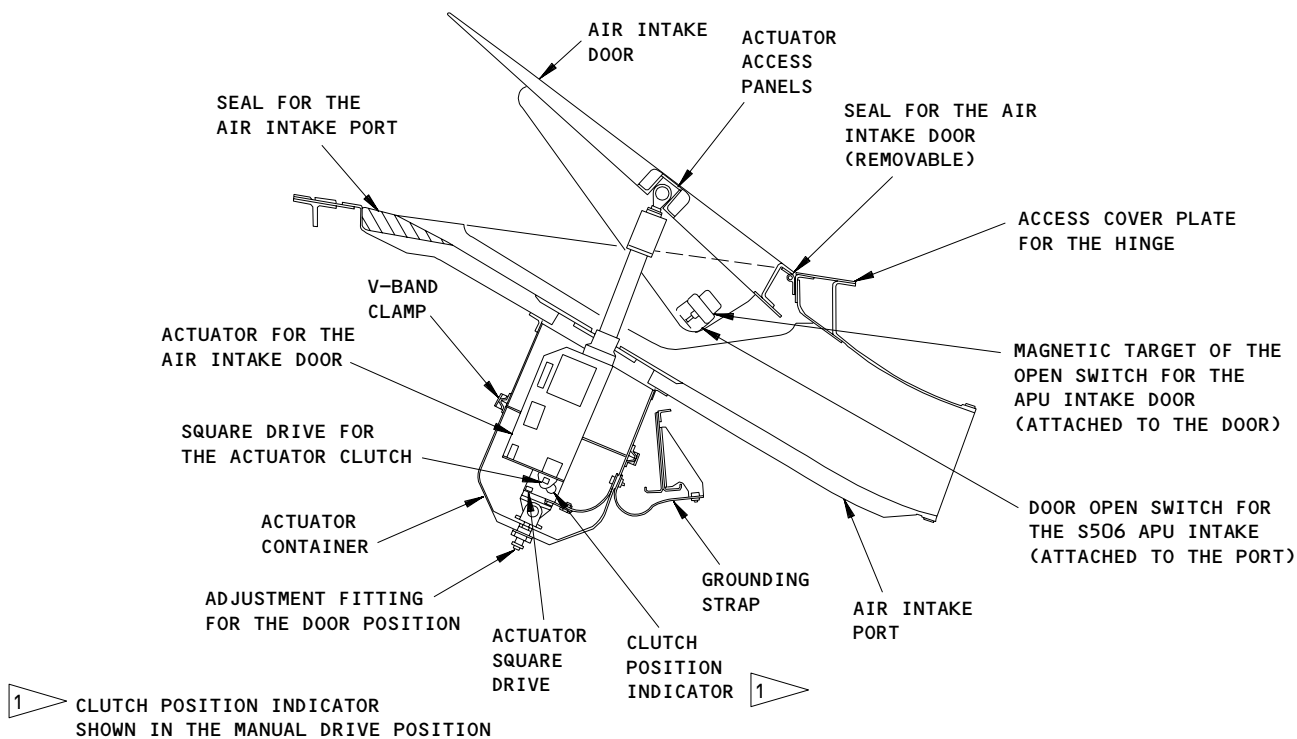
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49-15-00

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Page 1  
Nov 10/97

- B. Air Intake Door (Fig. 2)
  - (1) The air intake door is hinged at the rear in the intake port and opens outward to draw air into the APU. It is always fully opened when the APU is operating. An electromechanical linear actuator operates the door. A door-open switch is mounted in the APU intake port.
- C. Air Intake Door Seal (Fig. 2)
  - (1) The seals for the air intake door are located on the intake port around the door opening. The removable seal is in three sections bolted to the port along the rear of the door.
- D. Air Intake Port Seal (Fig. 2)
  - (1) SEAL FOR THE AIR INTAKE PORT WITH FASTENING BOLTS;  
The seal for the air intake port is bolted around the front and sides of the port assembly for the air intake.

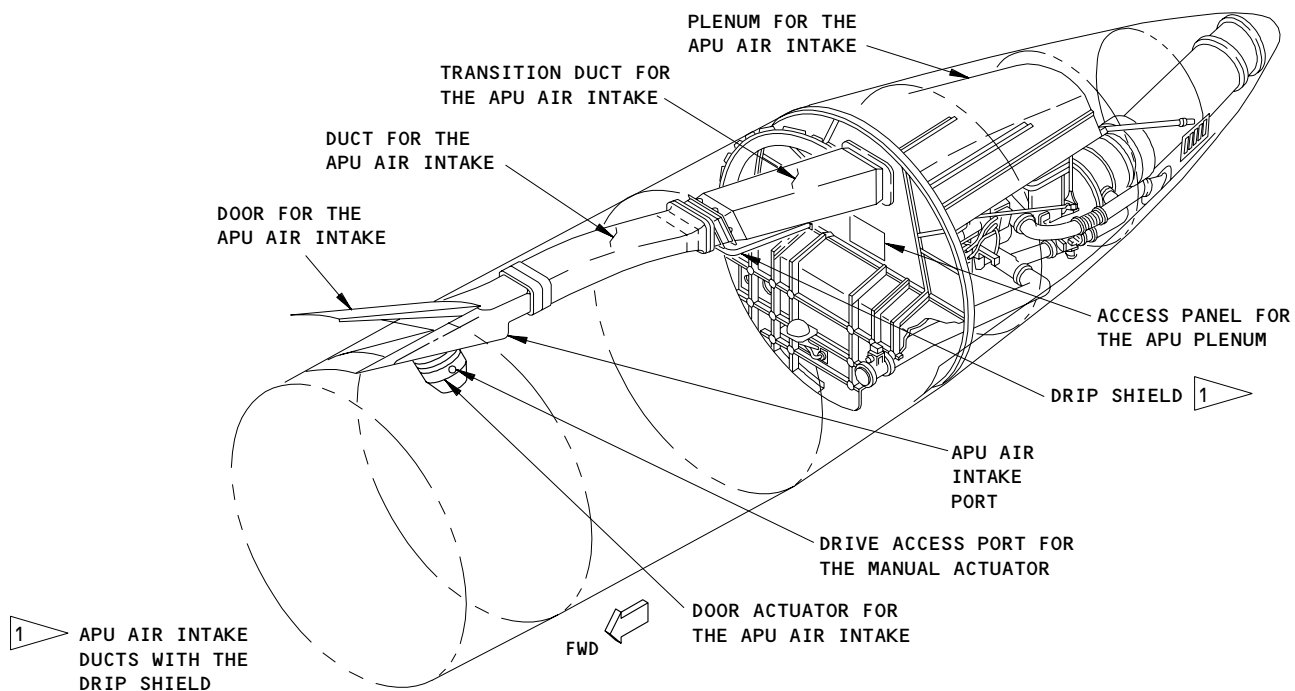


APU Air Intake Door and Actuator  
Figure 2

EFFECTIVITY	
	ALL

49-15-00

- (2) SEAL FOR THE AIR INTAKE PORT WITHOUT FASTENING BOLTS;  
The seal for the air intake port is bonded around the front and sides of the port assembly for the air intake.
- E. Air Intake Door Actuator (Fig. 2)
  - (1) The actuator for the air intake door mounts on the intake port with the rod end bolted to the door. It consists of an electric motor, actuator rod, jackscrew, reduction gear train, four limit switches, drive socket for manual operation, and a housing. Mechanical stops are located beyond the limit switches in case of limit switch failure. Access to a manual drive socket is through a port on the inboard side of actuator housing. The housing is attached to the air inlet port with a V-band clamp. The actuator is powered by the 28 volt dc APU battery bus.
- F. Air Intake Ducts (Fig. 3)
  - (1) The intake ducts form a passage from the air intake port to the air intake plenum. There are two ducts, one forward and one aft. The forward duct is a composite of graphite-kevlar-fiberglass material. The forward end is in a slip joint connection with the intake port while the aft end is bolted to a bulkhead.



APU Air Intake Duct Location  
Figure 3

EFFECTIVITY	
	ALL

49-15-00

- (2) The aft APU air intake duct is of fiberglass construction with fiberglass adaptors used for installation. The aft end is bolted to the APU firewall.

APU AIR INTAKE DUCTS WITH THE DRIP SHIELD;

A drip shield is installed below the aft APU air intake duct to prevent water leakage to the center elevator autopilot servo.

G. Air Intake Plenum (Fig. 3)

- (1) The intake plenum serves as the major supporting structure of the APU. It is attached to the APU firewall around the perimeter of its forward end. The APU is hung from the plenum by tubular supports and vibration isolators. The plenum flange seal is a compressible seal between the compressor inlet plenum of the APU and the intake plenum. A removable access panel located on the forward end allows for inspection of the interior of the plenum.

3. Operation

A. Functional Description (Fig. 4)

- (1) The intake door actuator for the APU air and control circuit power are supplied by the APU battery bus and the main battery bus with 28 volts dc.
- (2) The main battery switch must be on to initiate start of the APU engine. The APU start switch is placed to START and released to ON. This initiates APU automatic start and opens the air intake door automatically. If the switch is placed directly to ON, the air intake door opens but the APU will not start. EICAS displays APU DOOR on the maintenance and status modes when door isn't in scheduled position.
- (3) When the APU switch is placed to OFF, the APU control unit automatically shuts down the engine and closes the air intake door.

B. BITE

- (1) The APU control unit writes automatic shutdown causes in BITE memory. A shutdown because the door position is incorrect causes DOOR SYSTEM to show on the REASON APU NOT OPERATING matrix. A short circuit on the inlet door relay causes INLET DOOR RLY to show on the FAULTY LRU matrix.

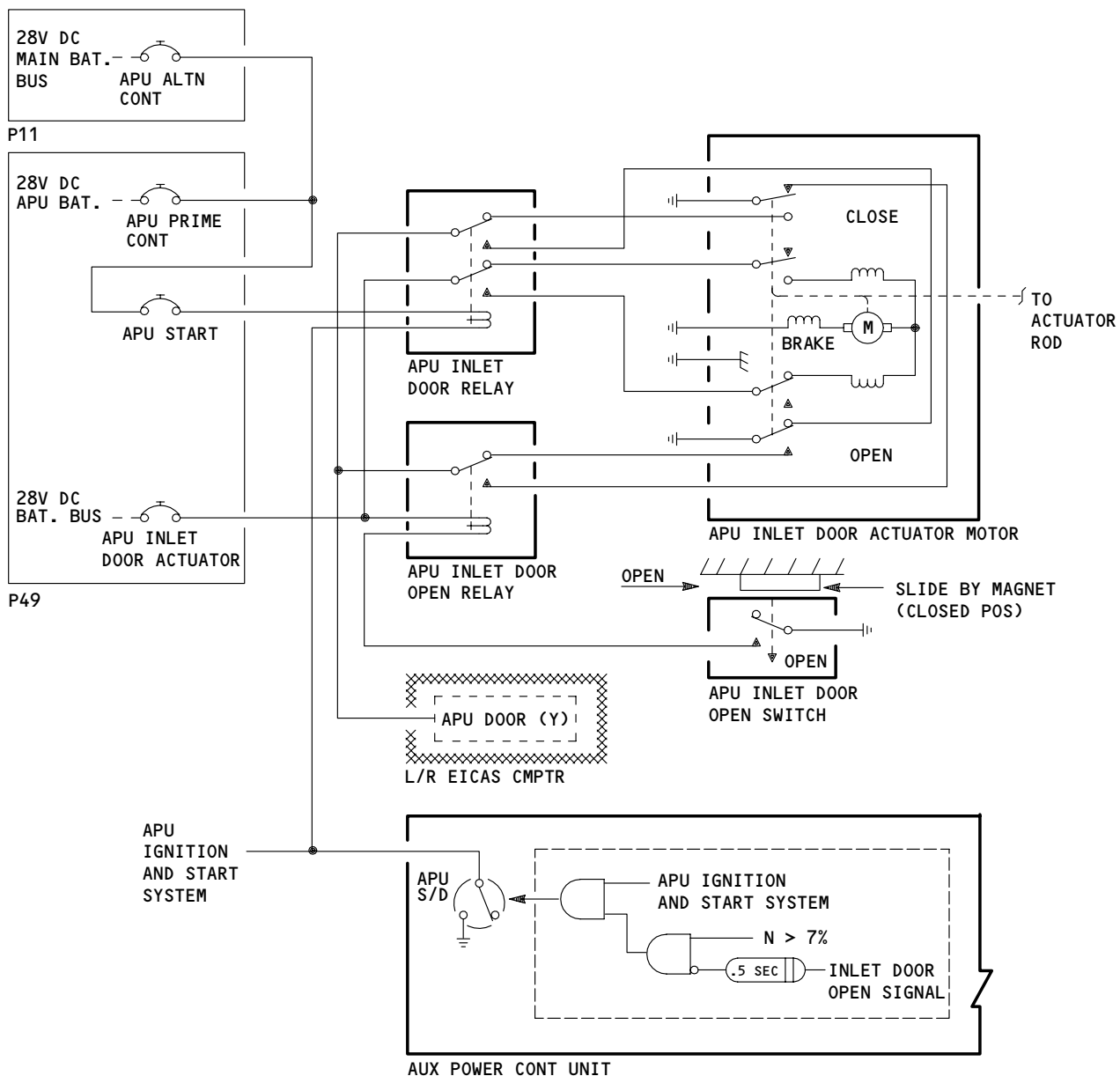
EFFECTIVITY

ALL

49-15-00

04

Page 4  
Dec 22/02



APU Air Intake Door Control Schematic  
Figure 4

EFFECTIVITY	ALL
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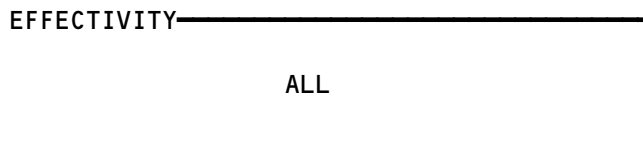
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**BOEING**  
 767  
 FAULT ISOLATION/MAINT MANUAL

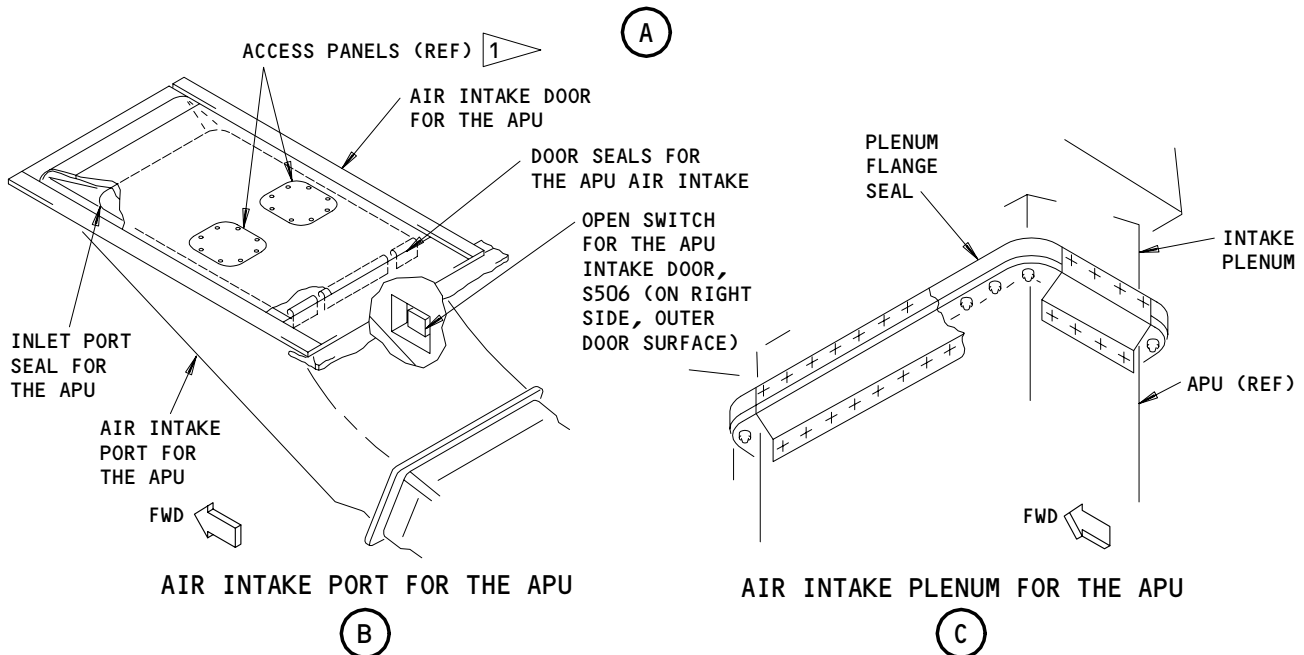
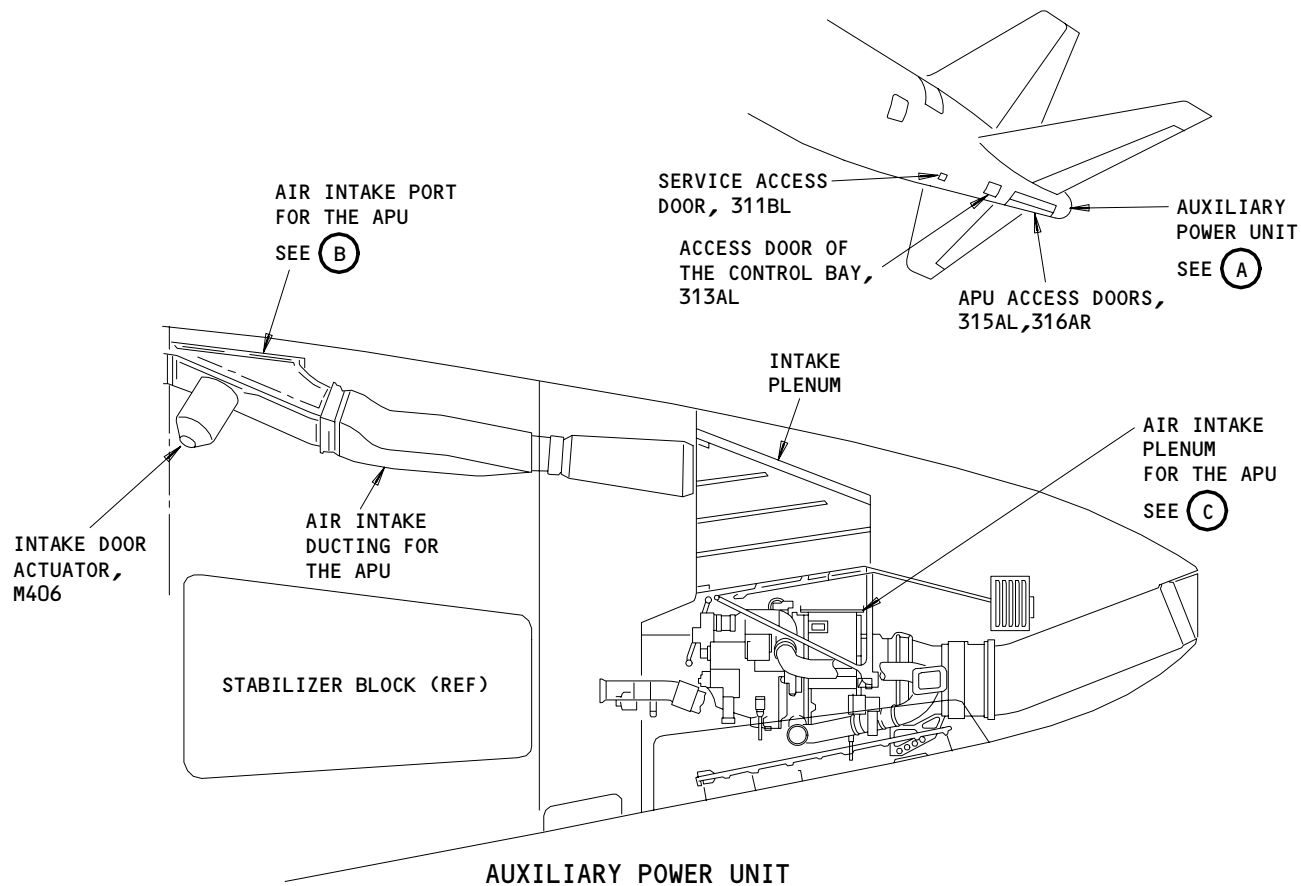
APU AIR INTAKE

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ACTUATOR - DOOR, M406	1	1	311BL, STABILIZER COMPT, AUXILIARY POWER UNIT	49-15-06
DOOR - APU AIR INTAKE	1	1	APU AIR INTAKE PORT	49-15-05
DUCT	1	2	311BL,313AL, STABILIZER COMPT, AUXILIARY POWER UNIT	49-15-01
PORT - APU AIR INTAKE	1	1	311BL, STABILIZER COMPT, AUXILIARY POWER UNIT	49-15-08
RELAYS - (31-01-49/101) APU INLET DOOR, K176 APU INLET DOOR OPEN, K547				
PLENUM - INTAKE	1	1	313AL,315AL,316AR, APU COMPT, APU AIR INTAKE PLENUM	49-15-03
SEAL - APU INLET DOOR	1	3	APU AIR INTAKE PORT	49-15-07
SEAL - APU AIR INTAKE PORT	1	1	APU AIR INTAKE PORT	49-15-09
SEAL - PLENUM FLANGE	1	1	315AL,316AR, APU COMPT, APU AIR INTAKE PLENUM	49-15-04
SWITCH - (49-61-00/101) APU MASTER CONTROL, S1				
SWITCH - APU INTAKE DOOR OPEN, S506	1	1	311BL, STABILIZER COMPT, APU AIR INTAKE PORT	49-15-02

APU Air Intake - Component Index  
Figure 101



**49-15-00**



1 ACCESS PANELS NOT INSTALLED ON ALL AIRPLANES

APU Air Intake - Component Location  
Figure 102

EFFECTIVITY	ALL
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49-15-00

AIR INTAKE - ADJUSTMENT/TEST

1. General

- A. This procedure contains a task to do a system test of the air intake system for the APU.
- B. It is not necessary to do this task to do an operational test of the intake door actuator. Use the APU operation procedure to start the APU for an operational test of the intake door actuator.
- C. It is not necessary to adjust the air intake system during this procedure.

TASK 49-15-00-705-001

2. APU Air Intake System Test

A. References

- (1) AMM 24-22-00/201, Electrical Power

B. Access

(1) Location Zones

- 119 Main Equipment Center
- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 313 Stabilizer Torsion Box Compartment - Left
- 314 Stabilizer Torsion Box Compartment - Right

(2) Access Panels

- 119AL Main Equipment Center Door - Left
- 822 Aft Cargo Door

C. Procedure

S 865-004

(1) Set the circuit breakers:

(a) Make sure these circuit breakers are closed:

- 1) P11 Overhead Panel
  - a) 11A33, IND LIGHTS 1
  - b) 11B35, APU ALTN CONT
  - c) 11D34, FUEL DC PUMP PWR
  - d) 11D35, FUEL DC PUMP CONT

EFFECTIVITY

ALL

49-15-00

01

Page 501  
Apr 22/04



- e) 11J2, EICAS CMPTR L
- f) 11J3, EICAS UPPER DSPL
- g) 11J29, EICAS CMPTR R
- h) 11J30, EICAS LOWER DSPL
- i) 11J31, EICAS DISPLAY SWITCHING
- j) 11J32, EICAS DISPLAY SELECT
- k) 11M25, FUEL PUMPS L FWD R AFT
- l) 11S23, APU BLEED PWR
- m) 11S24, APU BLEED CONT
- 2) P6 Circuit Breaker Panel
  - a) 6E3, FUEL VALVES APU
  - b) 6G24, L FWD FUEL BOOST PUMP
- 3) P33 Equipment Panel
  - a) 33B7, ELECTRICAL POWER P-6 GND SERVICE BUS
  - b) 33E5, ELECTRICAL POWER BATTERY CHARGER APU
- 4) P49 APU Auxiliary Panel
  - a) 49C2, APU PRIME CONT
  - b) 49C3, APU START
  - c) 49C4, APU INLET DOOR ACT
  - d) 49E3, APU BAT BUS
  - e) 49E4, APU BAT CHGR

S 865-005

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11T35, TRU APU START CONT
  - (b) P34 APU External Power Panel
    - 1) 34B16, APU PWR GND SVCE BUS
  - (c) P32 Right Generator Power Panel
    - 1) 32A6, APU START TRU
  - (d) P49 APU Auxiliary Panel
    - 1) 49D3, TRU FAN

S 865-014

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

S 735-008

- (4) Do the system test for the air intake system:
  - (a) Turn the main battery switch on the P5 panel to the ON position.
  - (b) Turn the APU control switch on the P5 panel to the ON position.
  - (c) Make sure the APU FAULT light immediately comes on during the operation of the APU door and the fuel supply valve.

NOTE: The FAULT light will go out when the fuel supply valve is fully open.

- (d) Make sure the air intake door opens.
- (e) Turn the APU control switch on the P5 panel to the OFF position.
- (f) Make sure the air intake door closes.

EFFECTIVITY

ALL

49-15-00

05

Page 502  
Apr 22/04

- (g) Make sure the APU FAULT light comes on during the operation of the fuel supply valve.
- (h) Turn the main battery switch on the P5 panel to the OFF position.

S 865-009

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49D3, TRU FAN
  - (b) P32 Right Generator Power Panel
    - 1) 32A6, APU START TRU
  - (c) P11 Overhead Panel
    - 1) 11T35, TRU APU START CONT

S 865-012

- (6) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the P33 Equipment Panel:
  - (a) 34B16, APU PWR GND SVCE BUS

S 865-013

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

EFFECTIVITY

ALL

49-15-00

04

Page 503  
Apr 22/04

AIR INTAKE DUCT - REMOVAL/INSTALLATION

1. General

- A. This procedure has these tasks:
  - (1) A removal of the air intake duct
  - (2) An installation of the air intake duct.
- B. The air intake duct supplies air from the air intake door to the APU inlet plenum. The air intake duct has two parts, the forward duct and the aft duct. You can remove the forward duct while you leave the aft duct installed. You must remove the forward duct to remove the aft duct.
- C. You can get access to the air intake duct through the access door for the horizontal stabilizer compartment.

TASK 49-15-01-004-001

2. Air Intake Duct Removal (Fig. 401)

- A. References
  - (1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems

- B. Access

- (1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
313	Stabilizer Torsion Box Compartment - Left
314	Stabilizer Torsion Box Compartment - Right

- (2) Access Panels

312AR	Service Access Door
313AL	Controls Access Door
822	Aft Cargo Door

- C. Procedure

- S 864-002

- (1) Do this task: Remove Hydraulic Power (AMM 29-11-00/201).

- S 864-048

- (2) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

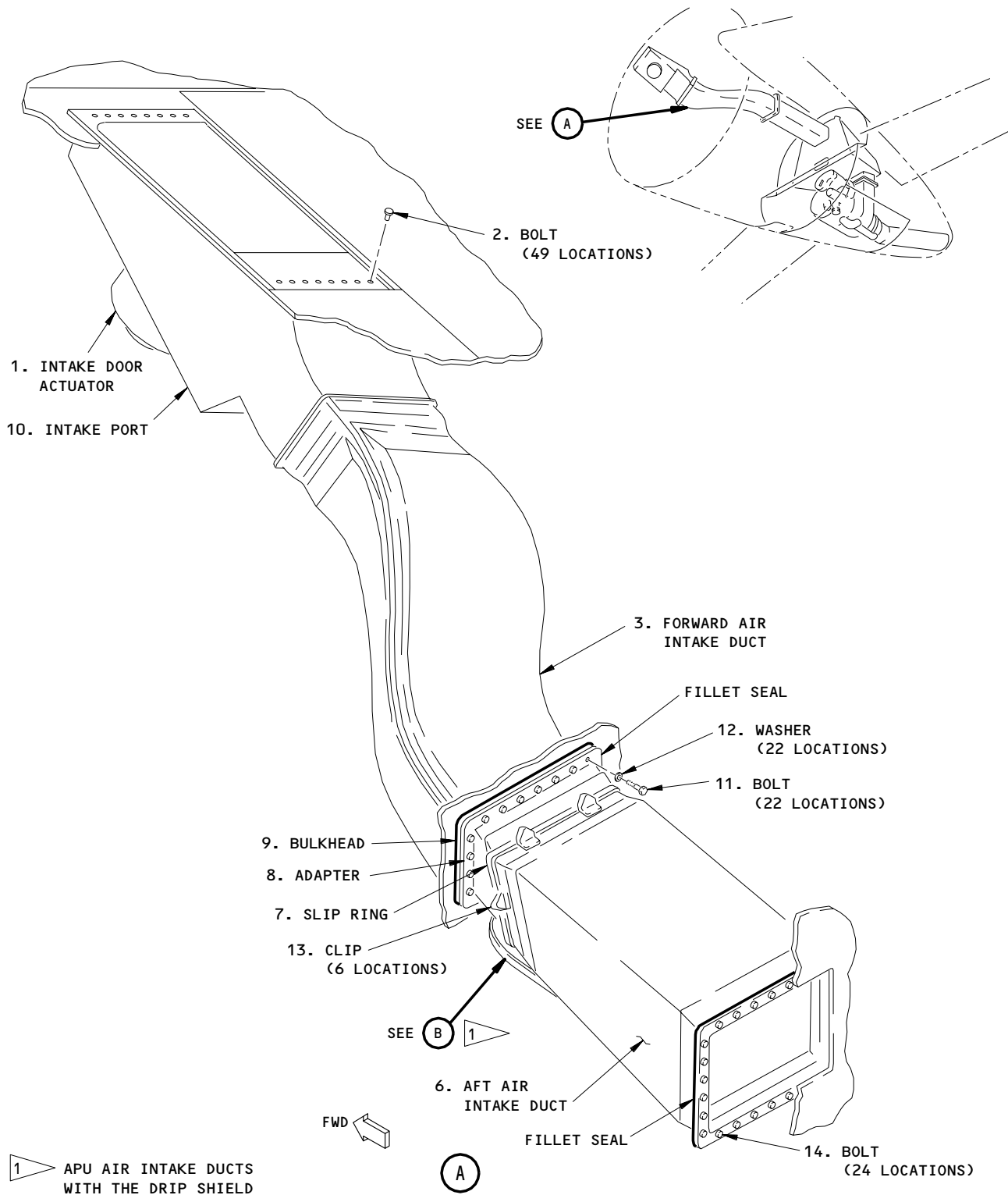
EFFECTIVITY

ALL

49-15-01

01

Page 401  
Aug 22/05



Air Intake Duct Installation  
Figure 401 (Sheet 1)

EFFECTIVITY

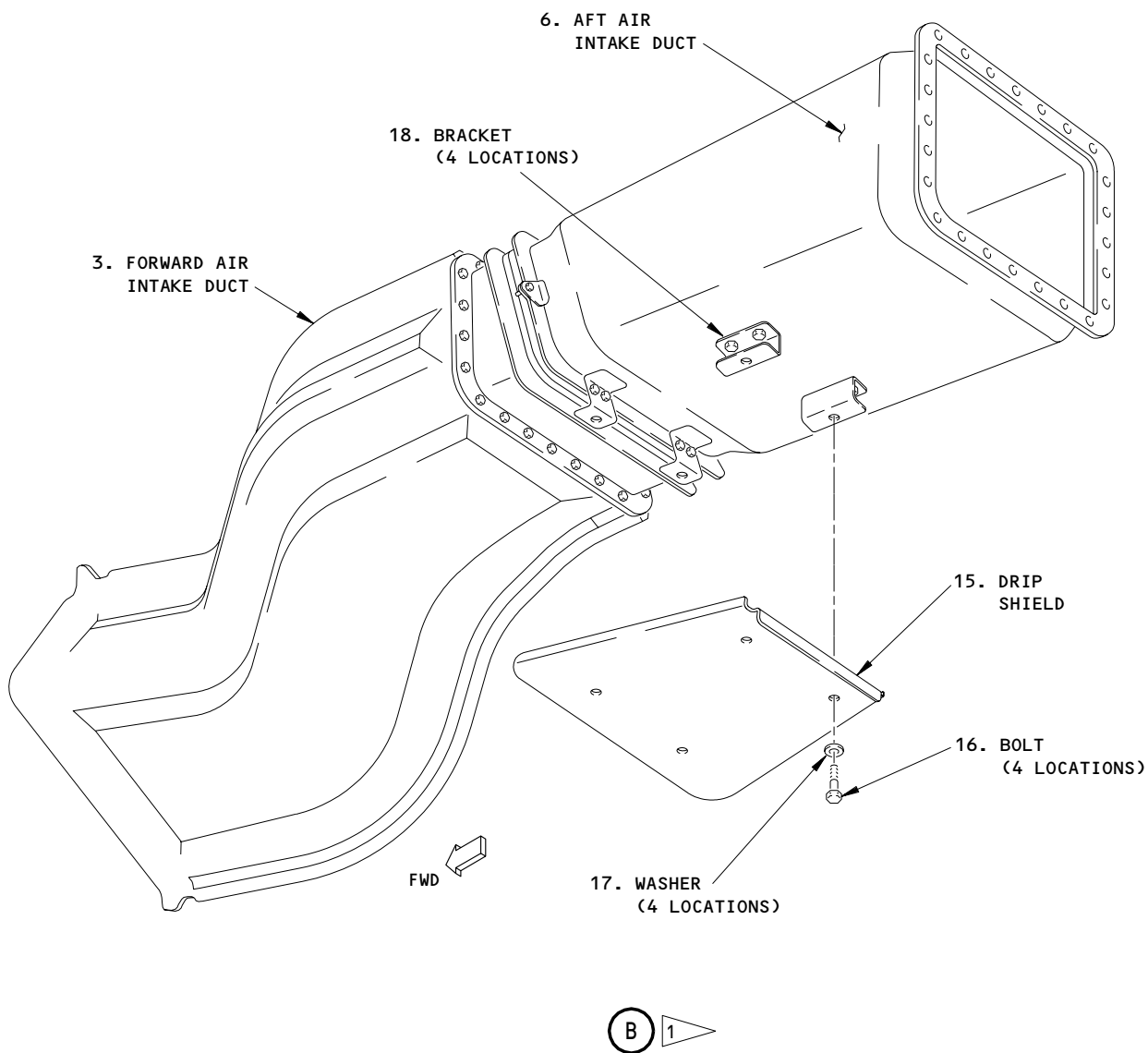
ALL

49-15-01

02

Page 402  
Aug 22/07

168382



Air Intake Duct Installation  
Figure 401 (Sheet 2)

EFFECTIVITY

ALL

49-15-01

04

Page 403  
Dec 22/02

168992

S 864-049

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
    - 3) 49C4, APU INLET DOOR ACT

S 014-008

**WARNING:** THE CONTROLS ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT TO GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (4) Open the service access door, 312AR.

S 484-053

- (5) If it is necessary, install a service platform over the service access door, 312AR.

S 024-051

- (6) Do these steps to remove the forward intake duct (3):

**NOTE:** It is necessary to loosen the air intake port before you can correctly remove the forward intake duct.

It is recommended that you use two persons to remove the forward intake duct. The location of the first person is on the outside of the airplane, on a service platform near the air intake door. The location of the second person is in the stabilizer torsion box compartment and near the forward intake duct.

- (a) Disconnect the ground wires from the bracket that grounds the intake door actuator (1) to the airplane.
- (b) Disconnect the electrical connector from the side of the housing for the intake door actuator (1).
- (c) Remove the bolts (2) that attach the intake port (10) to the external side of the airplane.
- (d) Remove the bolts (11) and the washers (12) that attach the forward intake duct (3) to the bulkhead (9).
- (e) Move the forward intake duct (3) at an angle with the aft end down.
- (f) Move the forward intake duct (3) aft to disconnect it from the air intake port (10).
- (g) Remove the forward intake duct (3).

EFFECTIVITY

ALL

49-15-01

03

Page 404  
Dec 22/02

S 024-015

- (7) Do these steps to remove the aft intake duct (6):

**NOTE:** The forward intake duct must be removed before you can remove the aft intake duct.

**WARNING:** THE CONTROLS ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (a) Open the controls access door, 313AL.
- (b) If it is necessary, install a service platform over the controls access door, 313AL.
- (c) APU AIR INTAKE DUCTS WITH THE DRIP SHIELD;  
Remove the four bolts (16), four washers (17) and drip shield (15) from the four brackets (18) on the aft air intake duct (6).
- (d) Remove the fasteners that attach the slip ring (7) to the clips (13).
- (e) Move the slip ring (7) forward to disconnect the aft intake duct (6) from the adapter (8).
- (f) Remove the bolts (14) that attach the aft intake duct (6) to the plenum.
- (g) Remove the aft intake duct (6).

S 214-021

- (8) If the removed ducts are to be installed in the airplane again, visually examine the ducts:
- (a) Examine the internal sides of the duct(s) for foreign objects, chips, and cracks.
  - (b) Examine the external side of the duct(s) for cracks.

TASK 49-15-01-404-022

3. Air Intake Duct Installation (Fig. 401)

A. References

- (1) AMM 24-22-00/201, Electrical Power - Control
- (2) AMM 29-11-00/201, Main (Left, Center, and Right) Hydraulic Systems
- (3) AMM 51-31-01/201, Seals and Sealing

B. Equipment

- (1) Ohmmeter (or alternative tool)
  - (a) C15292 Ohmmeter - Electrical Bonding (also called T477W) (recommended)  
Avtron Mfg. Inc.  
10409 Meech Ave., Cleveland, OH 44105-4166

EFFECTIVITY

ALL

49-15-01

02

Page 405  
Dec 22/02

- (b) Model 1010-A Micro-Ohmmeter - Autoranging/Autotest,  
10 Micro-ohms to 200 Ohms, Accuracy: 0.05% (alternative)  
Barberree Custom Design  
1401 Laurier House, 1600 Beach Ave., Vancouver, BC Canada  
V6G 1Y6, DC

C. Consumable Materials

- (1) A00247 Sealant, Pressure and Environmental - BMS5-95
- (2) B00130 Alcohol, Isopropyl - TT-I-735
- (3) G00034 Cloth, Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)  
- BMS15-5 or
- (4) G02330 Brush, Stiff Bristle, Non-Metallic - Tampico GA55-1

D. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Duct Assembly (Forward Air Intake Duct)	49-15-01	01	20
	6	Duct Assembly (Aft Air Intake Duct)			51

E. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 313 Stabilizer Torsion Box Compartment - Left
- 314 Stabilizer Torsion Box Compartment - Right

(2) Access Panels

- 312AR Service Access Door
- 313AL Controls Access Door
- 822 Aft Cargo Door

F. Procedure

S 424-023

- (1) Do these steps to install the aft intake duct (6):
  - (a) Put the aft intake duct (6) in its position.
  - (b) Install the bolts (14) that attach the aft intake duct (6) to the plenum.
  - (c) Move the slip ring (7) over the aft intake duct (6).
  - (d) Install the fasteners that attach the slip ring (7) to the clips (13).
  - (e) Seal the aft end of the aft intake duct (6) with a fillet seal (AMM 51-31-01/201).
  - (f) If the adapter (8) was removed, seal the adapter with a fillet seal at the bulkhead (AMM 51-31-01/201).

EFFECTIVITY

ALL

49-15-01

01

Page 406  
Aug 22/05



- (g) APU AIR INTAKE DUCTS WITH THE DRIP SHIELD;  
Install the drip shield (15) to the four brackets (18) on the aft air intake duct (6) with the four washers (17) and four bolts (16).

S 424-029

- (2) Do these steps to install the forward intake duct (3):

NOTE: If the aft intake duct was removed, it must be installed before you install the forward intake duct.

- (a) Put the forward intake duct (3) on the intake port (10).
- (b) Attach the forward intake duct (3) to the bulkhead (9) with the bolts (11) and the washers (12).
- (c) Seal the aft end of the forward intake duct (3) with a fillet seal (AMM 51-31-01/201).
- (d) Make sure the intake ducts are installed correctly:
- (e) Make sure the connections at the intake port, at the bulkhead, and at the plenum are tight.
- (f) Make sure the ducts are sealed correctly.

S 424-050

- (3) Do these steps to install the air intake port (10):

- (a) Install the bolts (2) that attach the intake port (10) to the external side of the airplane.
- (b) Clean the surfaces of the bracket and the ground wires with alcohol and a cloth or brush.
- (c) Use a small amount of pressure on the cloth or brush while you clean the surfaces of the bracket and the ground wires.
- (d) Continue to clean the surfaces until there is no visible residue on the surfaces.
- (e) Install the ground wires to the bracket.
- (f) Use an ohmmeter to make sure the bonding resistance between the actuator for the air intake door and the airplane structure is less than 0.001 ohm.

EFFECTIVITY

ALL

49-15-01

04

Page 407  
Dec 22/02

- (g) Connect the electrical connector to the housing for the intake door actuator (1).
- G. Put the Airplane Back to Its Usual Conditions
- S 084-054
- (1) Remove the service platforms that you used.
- S 414-055
- (2) Close the service access door, 312AR and controls access door, 313AL.
- S 864-039
- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
- 1) 49C2, APU PRIME CONT
- 2) 49C3, APU START
- 3) 49C4, APU INLET DOOR ACT
- (b) P11 Overhead Panel
- 1) 11B35, APU ALTN CONT
- S 864-047
- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.
- S 864-044
- (5) If it is necessary, supply hydraulic pressure to the left, the right, and the center hydraulic system (AMM 29-11-00/201).
- S 714-045
- (6) Do an operational test of the air intake door:
- (a) Supply electrical power to the airplane (AMM 24-22-00/201).
- (b) Turn the APU control switch on the P5 overhead panel to ON.
- (c) Look at the air intake door and make sure it is open.
- (d) Turn the APU control switch on the P5 overhead panel to OFF.
- (e) Look at the air intake door and make sure it is closed.

EFFECTIVITY

ALL

49-15-01

02

Page 408  
Dec 22/02

 **BOEING**  
767  
MAINTENANCE MANUAL

- (f) Remove the electrical power from the airplane if it is not necessary (AMM 24-22-00/201).

EFFECTIVITY

ALL

**49-15-01**

01

Page 409  
Dec 22/02

AIR INTAKE DOOR OPEN SWITCH – REMOVAL/INSTALLATION

1. General

- A. This procedure has these tasks:  
(1) A removal of the air intake door open switch  
(2) An installation of the air intake door open switch.
- B. The sensor is referred to as the air intake door open switch. The air intake door open switch is referred to as the door open switch.

TASK 49-15-02-004-001

2. Air Intake Door Open Switch Removal (Fig. 401)

- A. References  
(1) AMM 29-11-00/201, Main (Left, Right, and Center) Hydraulic Systems  
(2) SSM 49-00-04  
(3) WDM 49-15-11

B. Access

- (1) Location Zones
- |     |  |
|-----|--|
| 154 | Aft Cargo Compartment – Right              |
| 211 | Flight Compartment – Left                  |
| 212 | Flight Compartment – Right                 |
| 313 | Stabilizer Torsion Box Compartment – Left  |
| 314 | Stabilizer Torsion Box Compartment – Right |
- (2) Access Panels
- |       |                     |
|-------|---------------------|
| 312AR | Service Access Door |
| 822   | Aft Cargo Door      |

C. Procedure

- S 864-002  
(1) Do this task: Remove the Hydraulic Power (AMM 29-11-00/201).
- S 864-039  
(2) Make sure the L, C and R FLT CONTROL SHUTOFF TAIL switches on the P61 maintenance panel are OFF and attach DO-NOT-OPERATE tags.
- S 864-034  
(3) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.
- S 864-006  
(4) Open these circuit breakers and attach DO-NOT-CLOSE tags:  
(a) P11 Overhead Panel  
1) 11B35, APU ALTN CONT

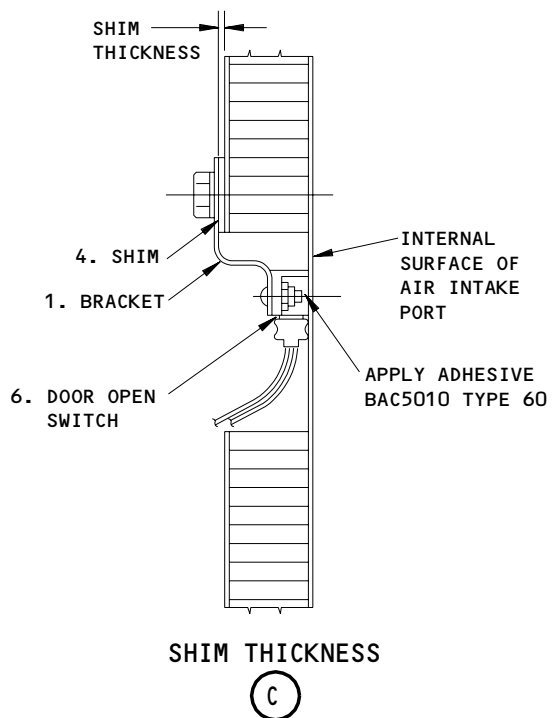
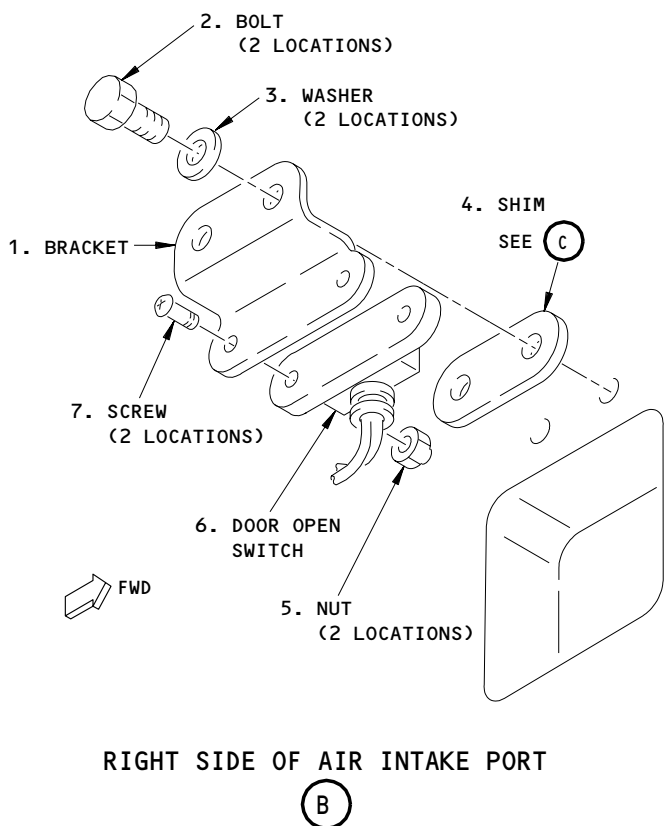
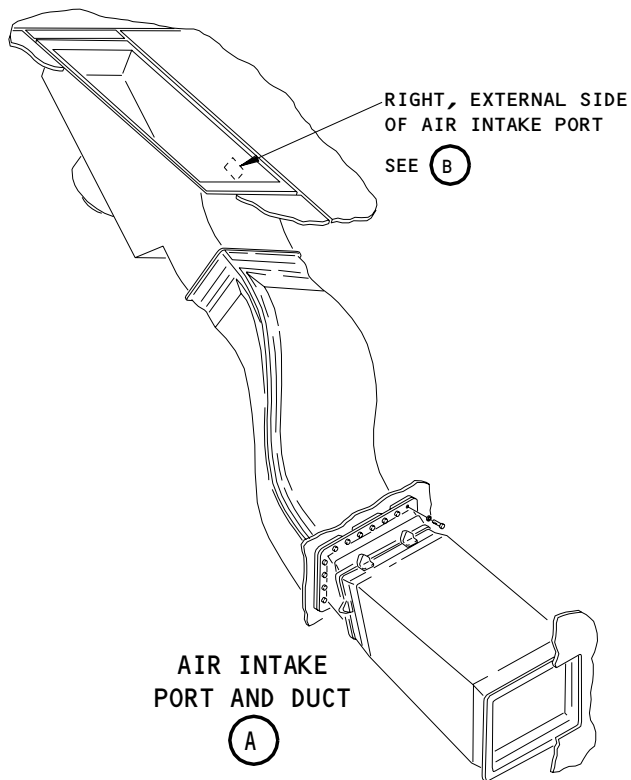
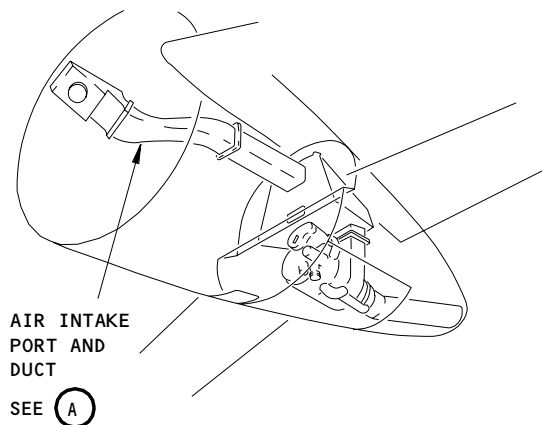
EFFECTIVITY

ALL

49-15-02

01

Page 401  
Aug 22/01



Air Intake Door Open Switch Installation  
Figure 401

EFFECTIVITY	ALL
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49-15-02

- 2) 11H17, L-FLT CONT SHUTOFF TAIL
- 3) 11H18, CTR-FLT CONT SHUTOFF TAIL
- 4) 11H27, R-FLT CONT SHUTOFF TAIL
- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
  - 3) 49C4, APU INLET DOOR ACT

S 014-008

**WARNING:** THE CONTROLS ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT TO GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (5) Open the service access door, 312AR.

S 484-035

- (6) If it is necessary, install a service platform over the service access door, 312AR.

D. Door Open Switch Removal

S 024-009

- (1) Do these steps to remove the door open switch (6):
  - (a) Remove the bolts (2) and the washers (3) that attach the bracket (1) and the shim (4) to the air intake port.
    - 1) Keep the shim (4) with the airplane.
  - (b) Cut the wires that connect the door open switch (6) to the airplanes wires.
  - (c) Remove the screws (7) and the nuts (5) that attach the door open switch (6) to the bracket (1).
  - (d) Remove the door open switch (6) from the bracket (1).

TASK 49-15-02-404-013

3. Air Intake Door Open Switch Installation (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems

EFFECTIVITY

ALL

49-15-02

03

Page 403  
Aug 22/01

- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) SWPM 20-30-12, Standard Wiring Practices Manual
- (4) SSM 49-00-04
- (5) WDM 49-15-11

B. Consumable Materials

- (1) A00553 Adhesive - BAC5010, Type 60

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	6	Sensor (Door Open Switch)	49-15-05	01 02	175 or 200

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 313 Stabilizer Torsion Box Compartment - Left
- 314 Stabilizer Torsion Box Compartment - Right

(2) Access Panels

- 312AR Service Access Door
- 822 Aft Cargo Door

E. Procedure

S 984-014

- (1) Do these steps to open the air intake door:

**CAUTION:** DO NOT APPLY TOO MUCH TORQUE TO THE MANUAL/ELECTRICAL SELECTOR SHAFT OR TO THE MANUAL DRIVE. IF TOO MUCH TORQUE IS APPLIED, YOU CAN CAUSE DAMAGE TO THE ACTUATOR. SEE THE MANUAL OPERATION DECAL ON THE AIR INTAKE DOOR ACTUATOR.

- (a) Open the manual/electrical selector shaft on the actuator:
  - 1) Put a 1/4-inch square drive in the manual/electrical selector shaft.
  - 2) Push the 1/4 inch square drive in and turn counterclockwise (about 90°) until you can see the manual drive socket.

**NOTE:** Do not use more than 10 inch-pounds (1.13 newton meters) of torque.

EFFECTIVITY

ALL

49-15-02

01

Page 404  
Aug 22/05

- (b) Use a 1/4 inch square drive to turn the manual drive socket counterclockwise until the door is fully open.

NOTE: Do not use more than 65 inch-pounds (7.3 newton-meters) of torque.

S 424-032

- (2) Do these steps to install the door open switch (6):
  - (a) Attach a new door open switch (6) to the bracket (1) with the screws (7) and nuts (5).
  - (b) Put the door open switch (6), the bracket (1), and the shim (4) in their position on the air intake port.
  - (c) Adjust the thickness of the laminated shim (4) so the door open switch (6) is flat against the side of the air intake port.
  - (d) Apply a small quantity (0.30-inch diameter by 0.10-inch high) (7.6 mm diameter by 2.5 mm high) of the adhesive to the face of the door open switch (6).
  - (e) Install the door open switch (6), the bracket (1), and the shim (4) until the adhesive is against the side of the air intake port.

NOTE: For this application, the adhesive is used only to dampen the vibration. It is not necessary to let the adhesive cure.

- (f) Attach the bracket (1) to the air intake port with the bolts (2) and the washers (3).
- (g) Connect the wires on the door open switch (6) to the airplane wires with a moisture proof splice (SWPM 20-30-12).

S 984-022

- (3) Do these steps to close the air inlet door:
  - (a) Use a 1/4-inch square drive to turn the manual drive socket clockwise until the door is fully closed.

NOTE: Do not use more than 65 inch-pounds (7.3 newton-meters) of torque.

EFFECTIVITY

ALL

49-15-02

01

Page 405  
Aug 22/02



- (b) Turn the manual/electrical selector shaft clockwise with a 1/4-inch square drive until you cannot see the manual drive socket any more.

NOTE: Do not use more than 10 inch-pounds (1.1 newton-meters) of torque.

F. Put the airplane back to its usual condition

S 084-037

- (1) If the service platform was installed over the service access door, 312AR, remove the service platform.

S 414-023

- (2) Close the service access door, 312AR.

S 864-024

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

- 1) 49C2, APU PRIME CONT
- 2) 49C3, APU START
- 3) 49C4, APU INLET DOOR ACT

(b) P11 Overhead Panel

- 1) 11B35, APU ALTN CONT
- 2) 11H17, L-FLT CONT SHUTOFF TAIL
- 3) 11H18, CTR-FLT CONT SHUTOFF TAIL
- 4) 11H27, R-FLT CONT SHUTOFF TAIL

S 864-040

- (4) Remove the DO-NOT-OPERATE tags from the L, C and R FLT CONTROL SHUTOFF TAIL switches on the P61 maintenance panel.

S 864-038

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-15-02

03

Page 406  
Aug 22/01

S 864-041

- (6) If it is necessary, pressurize the left, the right, and the center hydraulic systems (AMM 29-11-00/201).

S 714-030

- (7) Do an operational test of the door open switch (6):
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU start sequence, make sure the door open switch operates correctly.

NOTE: The APU will not start if the switch does not get the magnetic signal when the air intake door is fully open.

- (c) If the APU does not start, then do these steps:
  - 1) Set the APU control switch on the P5 overhead panel to the OFF position.
  - 2) Attach a DO-NOT-OPERATE tag to the APU control switch.
  - 3) Repair the cause of the problem.
  - 4) Remove the DO-NOT-OPERATE tag from the APU control switch.
  - 5) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - 6) If the APU does not start, do the door open switch repair again.
- (d) If it is not necessary to do other tasks, do this task: APU Shutdown Procedure (AMM 49-11-00/201).

EFFECTIVITY

ALL

49-15-02

01

Page 407  
Apr 22/00

AIR INTAKE PLENUM - INSPECTION/CHECK

1. General

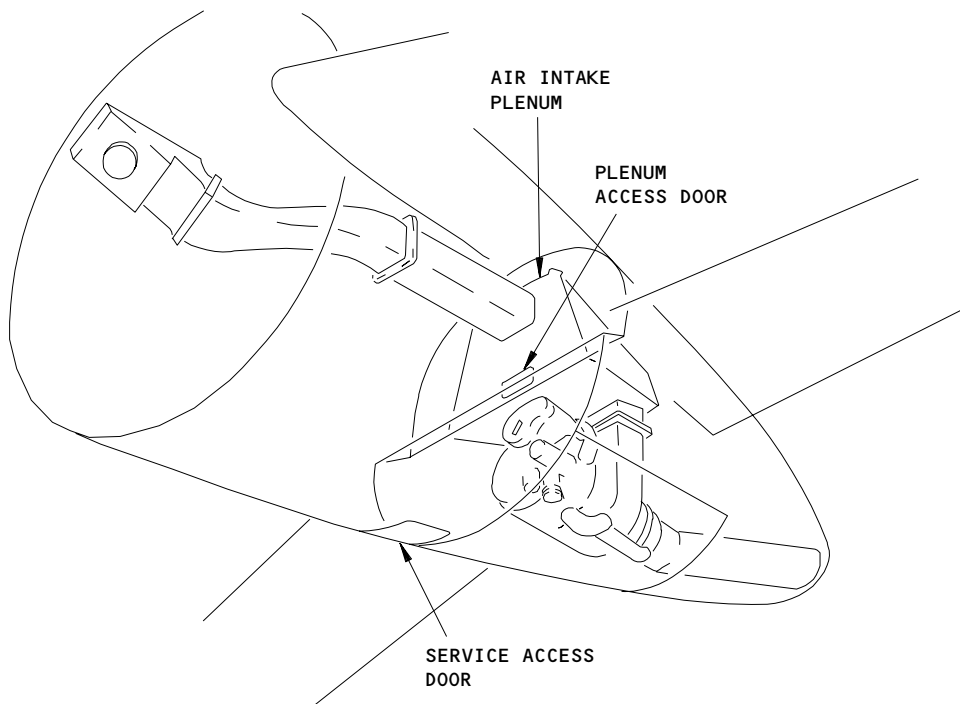
A. This procedure has the task to inspect the air intake plenum.

TASK 49-15-03-206-002

2. APU Air Intake Plenum Inspection (Fig. 601)

A. References

(1) AMM 29-11-00/201, Main Hydraulic (Left, Right and Center) Systems



Air Intake Plenum Inspection  
Figure 601

EFFECTIVITY

ALL

49-15-03

02

Page 601  
Apr 22/99

10130

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 313AL Controls Access Door - Left
- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Prepare for the inspection

S 866-010

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-011

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:

- (a) P11 Overhead Circuit Breaker Panel
  - 1) 11B35, APU ALTN CONT
  - 2) 11H17, L-FLT CONT SHUTOFF TAIL
  - 3) 11H18, CTR-FLT CONT SHUTOFF TAIL
  - 4) 11H27, R-FLT CONT SHUTOFF TAIL
- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 866-012

- (3) Do this task: Remove the Hydraulic Power (AMM 29-11-00/201).

S 866-015

- (4) Make sure the L, C and R FLT CONTROL SHUTOFF TAIL switches on the P61 maintenance panel are OFF and attach DO-NOT-OPERATE tags.

S 016-018

**WARNING:** THE CONTROLS ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT TO GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (5) Open the controls access door, 313AL.

EFFECTIVITY

ALL

49-15-03

03

Page 602  
Apr 22/05

S 486-019

- (6) If it is necessary, install a service platform over the controls access door, 313AL.

S 016-017

- (7) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left APU access door in the closed position, open the four latches on the right APU access door.

NOTE: The left APU access door will open fully and the right APU access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left APU access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right APU access door up and pull the detent latch aft until the latch disengages and releases the APU access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right APU access door.

- (d) Open the right APU access door to the fully open position and manually lock the hold-open strut.

D. Procedure

S 216-005

- (1) Visually examine the air intake plenum:
- (a) Remove the bolts from the plenum access door on the forward side of the APU firewall.
  - (b) Remove the plenum access door.
  - (c) Examine the inner area of the plenum for unwanted material.
  - (d) If it is necessary, clean the inner area of the plenum.
  - (e) Examine the plenum drain outlet for blockage.
  - (f) Examine the inner and the outer sides of the plenum walls for holes, dents, and cracks.
  - (g) Make sure all the fasteners that attach the plenum to the firewall are installed and tight.
  - (h) Examine the APU support brackets on the bottom and the sides of the plenum for cracks.
  - (i) Put the plenum access door in its position on the plenum.

EFFECTIVITY

ALL

49-15-03

02

Page 603  
Dec 22/07

(j) Install the bolts that attach the plenum access door to the plenum.

E. Put the Airplane Back to its Usual Condition

S 086-023

- (1) If the service platform was installed over the controls access door, 313AL, remove the service platform.

S 416-024

- (2) Close the controls access door, 313AL.

S 416-025

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right APU access door until the detent latch engages and holds the APU access door on the fuselage frame.

(c) Lift the left APU access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right APU access door.

S 866-013

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Circuit Breaker Panel

1) 11B35, APU ALTN CONT

2) 11H17, L-FLT CONT SHUTOFF TAIL

3) 11H18, CTR-FLT CONT SHUTOFF TAIL

4) 11H27, R-FLT CONT SHUTOFF TAIL

S 866-014

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-15-03

04

Page 604  
Dec 22/07

- S 866-016
- (6) Remove the DO-NOT-OPERATE tags from the L, C and R FLT CONTROL SHUTOFF TAIL switches on the P61 maintenance panel
- S 866-008
- (7) If it is necessary, supply hydraulic pressure to the left, right and center hydraulic system (AMM 29-11-00/201).

EFFECTIVITY

ALL

**49-15-03**

01

Page 605  
Apr 22/05

AIR INTAKE PLENUM FLANGE SEAL – REMOVAL/INSTALLATION

1. General

- A. This procedure has these tasks:
  - (1) A removal of the air intake plenum flange seal
  - (2) An installation of the air intake plenum flange seal
- B. The air intake plenum flange seal is referred to as the plenum flange seal.
- C. You must remove the APU to get access to the plenum flange seal.

TASK 49-15-04-004-005

2. Air Intake Plenum Flange Seal Removal (Fig. 401)

- A. References
  - (1) AMM 49-11-01/401, Auxiliary Power Unit
- B. Access
  - (1) Location Zones
    - 211 Flight Compartment – Right
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right

C. Procedure

S 024-009

- (1) Do this task: APU Removal (AMM 49-11-01/401).

S 024-002

- (2) Do these steps to remove the plenum flange seal (1):
  - (a) Remove the bolts (2) and the washers (3) that attach the plenum flange seal (1) to the intake plenum flange (4).
  - (b) Remove the plenum flange seal (1) from the intake plenum flange (4).

TASK 49-15-04-404-006

3. Air Intake Plenum Flange Seal Installation (Fig. 401)

- A. References
  - (1) AMM 49-11-01/401, Auxiliary Power Unit

EFFECTIVITY

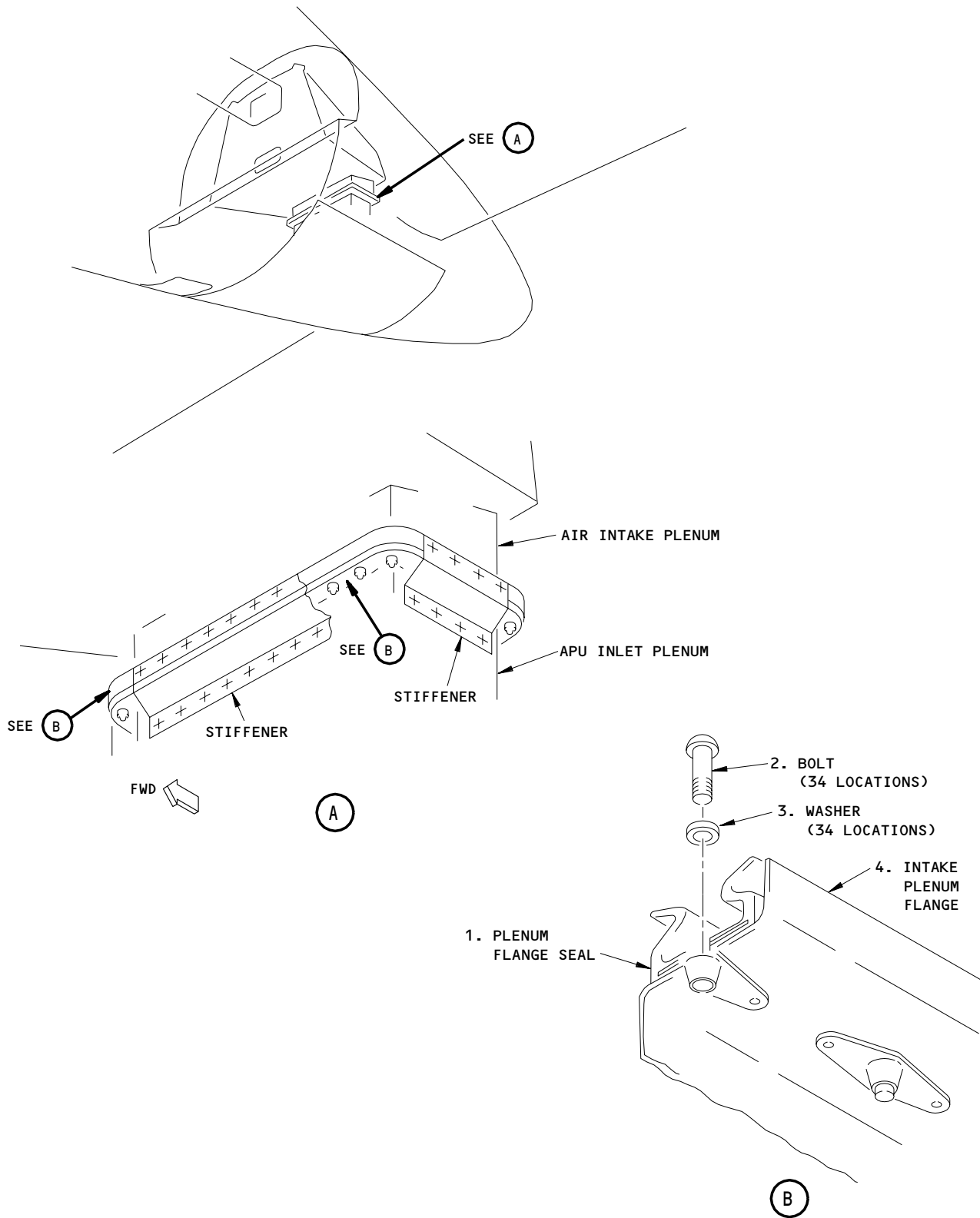
ALL

49-15-04

01

Page 401  
Aug 22/01





Air Intake Plenum Flange Seal Installation  
Figure 401

EFFECTIVITY	ALL
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49-15-04

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Air Inlet Seal (Plenum Flange Seal)	49-11-00 49-11-01	01 01	120 or 85

C. Access

(1) Location Zones

- 211 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

D. Procedure

S 424-003

- (1) Do these steps to Install the plenum flange seal (1):
- (a) Put the plenum flange seal (1) in its position on the intake plenum flange (4).
  - (b) Install the washers (3) and the bolts (2) that attach the plenum flange seal (1) to the intake plenum flange (4).

S 424-008

- (2) Do this task: APU Installation (AMM 49-11-01/401).

EFFECTIVITY

ALL

49-15-04

01

Page 403  
Aug 22/05

AIR INTAKE DOOR - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

- (1) A removal of the air intake door
- (2) An installation of the air intake door.

TASK 49-15-05-004-001

2. Air Intake Door Removal (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 311 Area Aft of Pressure Bulkhead - Left
- 312 Area Aft of Pressure Bulkhead - Right

(2) Access Panels

- 312AR Service Access Door
- 314DR Air Inlet Door Actuator
- 314ER Air Inlet Door Actuator
- 314FR Air Inlet Door Hinge
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Do this task: Remove Hydraulic Power (AMM 29-11-00/201).

S 864-040

- (2) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-006

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

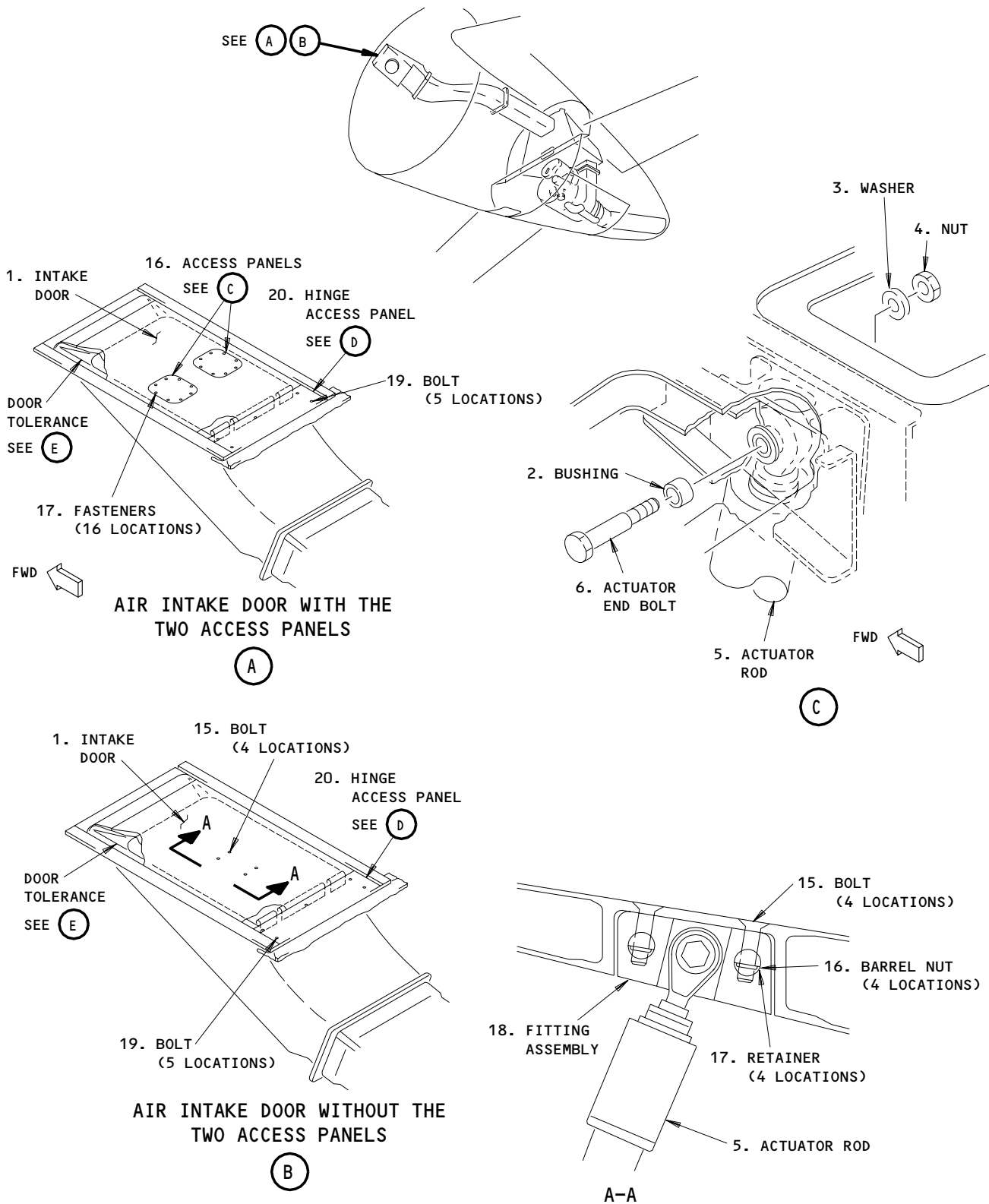
EFFECTIVITY

ALL

49-15-05

01

Page 401  
Aug 22/01



Air Intake Door Installation  
Figure 401 (Sheet 1)

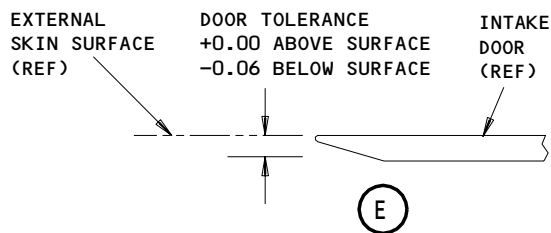
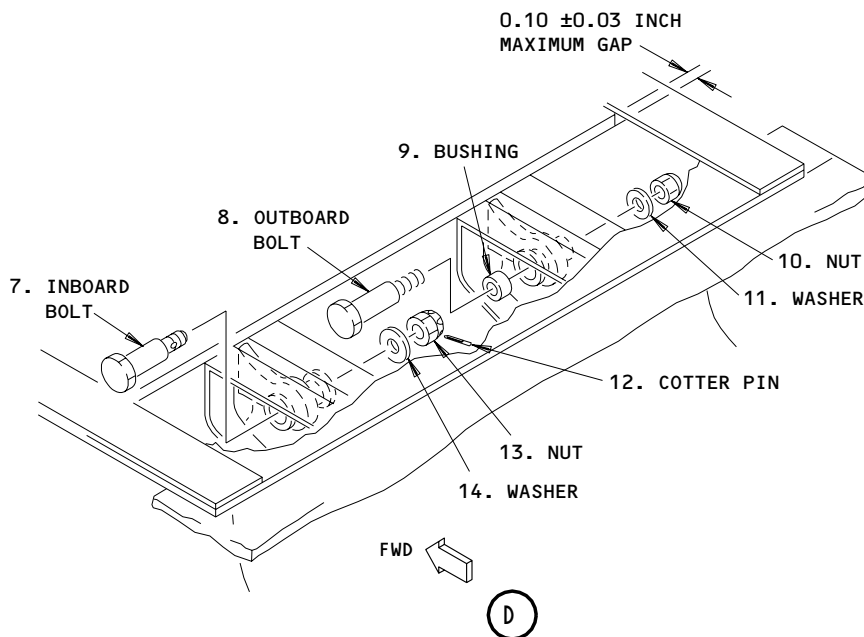
EFFECTIVITY

ALL

49-15-05

02

Page 402  
Nov 10/91



Air Intake Door Installation  
Figure 401 (Sheet 2)

EFFECTIVITY	ALL
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49-15-05

02

Page 403  
Aug 10/91

 **BOEING**  
767  
MAINTENANCE MANUAL

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
  - 3) 49C4, APU INLET DOOR ACT

S 014-033

**WARNING:** THE CONTROLS ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT TO GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (4) Open the service access door, 312AR.

S 484-044

- (5) If it is necessary, install a service platform over the service access door, 312AR.

S 984-030

- (6) Do these steps to manually open the air intake door (1):

**CAUTION:** DO NOT USE TOO MUCH TORQUE ON THE MANUAL/ELECTRICAL SELECTOR SHAFT OR ON THE MANUAL DRIVE. IF TOO MUCH TORQUE IS USED, YOU CAN CAUSE DAMAGE TO THE ACTUATOR. SEE THE MANUAL OPERATION DECAL ON THE AIR INTAKE DOOR ACTUATOR.

- (a) Open the manual/electrical selector shaft on the front end of the actuator as follows:
  - 1) Put a 1/4-inch square drive in the manual/electrical selector shaft.
  - 2) Push the 1/4-inch square drive in and turn counterclockwise (about 90°) until you can see the manual drive socket.

**NOTE:** Do not use more than 10 inch-pounds (1.1 newton-meters) of torque.

EFFECTIVITY

ALL

49-15-05

05

Page 404  
Apr 22/04

- (b) Turn the manual drive socket counterclockwise with the 1/4-inch square drive until you can get access to the actuator.

**NOTE:** Do not use more than 65 inch-pounds (7.4 newton-meters) of torque.

S 034-009

- (7) AIRPLANES WITH THE TWO ACCESS PANELS ON THE AIR INTAKE DOOR;  
Disconnect the actuator rod from the air intake door:
  - (a) Remove the fasteners (17) that attach the access panels (16) to external side of the air intake door.
  - (b) Remove the access panels (16).
  - (c) Remove the actuator end bolt (6), the bushing (2), the washer (3), and the nut (4) from the actuator rod (5).

S 034-010

- (8) AIRPLANES WITHOUT THE TWO ACCESS PANELS ON THE AIR INTAKE DOOR;  
Remove the four bolts (15) that attach the intake door (1) to the fitting assembly (18).

S 024-012

- (9) Do these steps to remove the air intake door (1):
  - (a) Remove the bolts (19) from the hinge access panel (20).
  - (b) Remove the hinge access panel (20).
  - (c) Remove the inboard bolt (7), the nut (13), the washer (14), and the cotter pin (12).
  - (d) Remove the outboard bolt (8), the bushing (9), the nut (10), and the washer (11).
  - (e) Remove the air intake door (1).

TASK 49-15-05-404-015

3. Air Intake Door Installation (Fig. 401)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems

EFFECTIVITY

ALL

49-15-05

03

Page 405  
Aug 22/01

(2) AMM 49-15-06/501, APU Air Intake Door Actuator

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Door Assembly (Air Intake Door)	49-15-05	01 02	20 or 330 or 20

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 311 Area Aft of Pressure Bulkhead - Right
- 312 Area Aft of Pressure Bulkhead - Right

(2) Access Panels

- 312AR Service Access Door
- 314DR Air Inlet Door Actuator
- 314ER Air Inlet Door Actuator
- 314FR Air Inlet Door Hinge
- 822 Aft Cargo Door

D. Procedure

S 424-017

- (1) Do these steps to install the air intake door (1):
- (a) Align the intake door (1) on the inboard and outboard hinge assemblies.
  - (b) Install the outboard bolt (8), the bushing (9), the washer (11), and the nut (10).
  - (c) Install the inboard bolt (7), the washer (14), the nut (13), and the cotter pin (12).
  - (d) Attach the hinge access panel (20) to the airplane with the bolts (19).

S 434-019

- (2) AIRPLANES WITH THE TWO ACCESS PANELS ON THE AIR INTAKE DOOR;  
Connect the air intake door to the actuator rod:
- (a) Align the actuator rod (5) with the air intake door (1).
  - (b) Attach the actuator rod (5) to the intake door (1) with the actuator end bolt (6), the bushing (2), the washer (3), and the nut (4).

EFFECTIVITY

ALL

49-15-05

03

Page 406  
Aug 22/05



- (c) Attach the access panels (16) to the external side of the air intake door (1) with the fasteners (17).

S 434-021

- (3) AIRPLANES WITHOUT THE TWO ACCESS PANELS ON THE AIR INTAKE DOOR;  
Connect the air intake door to the actuator rod:
  - (a) Align the fitting assembly (18) with the intake door (1).
  - (b) Install the bolts (15) on the external side of the air intake door (1).

S 984-034

**WARNING:** THE CONTROLS ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT TO GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (4) Do these steps to manually close the air intake door (1):
  - (a) Turn the manual drive socket clockwise with a 1/4-inch square drive until the door is fully closed.

**NOTE:** Do not use more than 65 inch-pounds (7.4 newton-meters) of torque.

- (b) Push and turn the manual/electrical selector shaft clockwise with a 1/4-inch square drive until you cannot see the manual drive socket.

**NOTE:** Do not use more than 10 inch-pounds (1.1 newton-meters) of torque.

S 224-022

- (5) Make sure the external side of the door is smooth with the skin surface to a tolerance of +0.00 to -0.06 inch.

EFFECTIVITY

ALL

49-15-05

03

Page 407  
Aug 22/01

- S 824-023
- (6) If the door is not in the tolerance of +0.00 to -0.06 inch, adjust the intake door actuator (AMM 49-15-06/501).
- S 084-045
- (7) If the service platform was installed over the service access door, 312AR, remove the service platform.
- S 414-032
- (8) Close the service access door, 312AR.
- S 864-024
- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
    - 3) 49C4, APU INLET DOOR ACT
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
- S 864-041
- (10) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.
- S 864-029
- (11) If it is necessary, supply hydraulic pressure to the left system, the right system, and the center system (AMM 29-11-00/201).

EFFECTIVITY

ALL

49-15-05

04

Page 408  
Aug 22/01

AIR INTAKE DOOR – INSPECTION/CHECK

1. General

- A. This procedure contains a task to inspect the air intake door.
- B. You must remove the air intake door to do the inspection.

TASK 49-15-05-206-001

2. Air Intake Door Inspection (Fig. 601)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems
- (2) AMM 49-15-05/401, Air Intake Door
- (3) AMM 49-15-06/401, Air Intake Door Actuator

B. Equipment

- (1) Gage – Feeler, 0.0 – 0.5 Inch

C. Access

(1) Location Zones

- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 313 Stabilizer Torsion Box Compartment – Left
- 314 Stabilizer Torsion Box Compartment – Right

(2) Access Panel

- 312AR Service Access Door

D. Procedure

S 866-043

- (1) Set the APU control switch on the P5 overhead panel to ON.

NOTE: This will open the air intake door but will not start the APU.

S 226-032

- (2) Use the feeler gage to measure the distance between the magnetic actuator and the inlet port sidewall.

S 866-044

- (3) Set the APU control switch on the P5 overhead panel to OFF to close the air intake door.

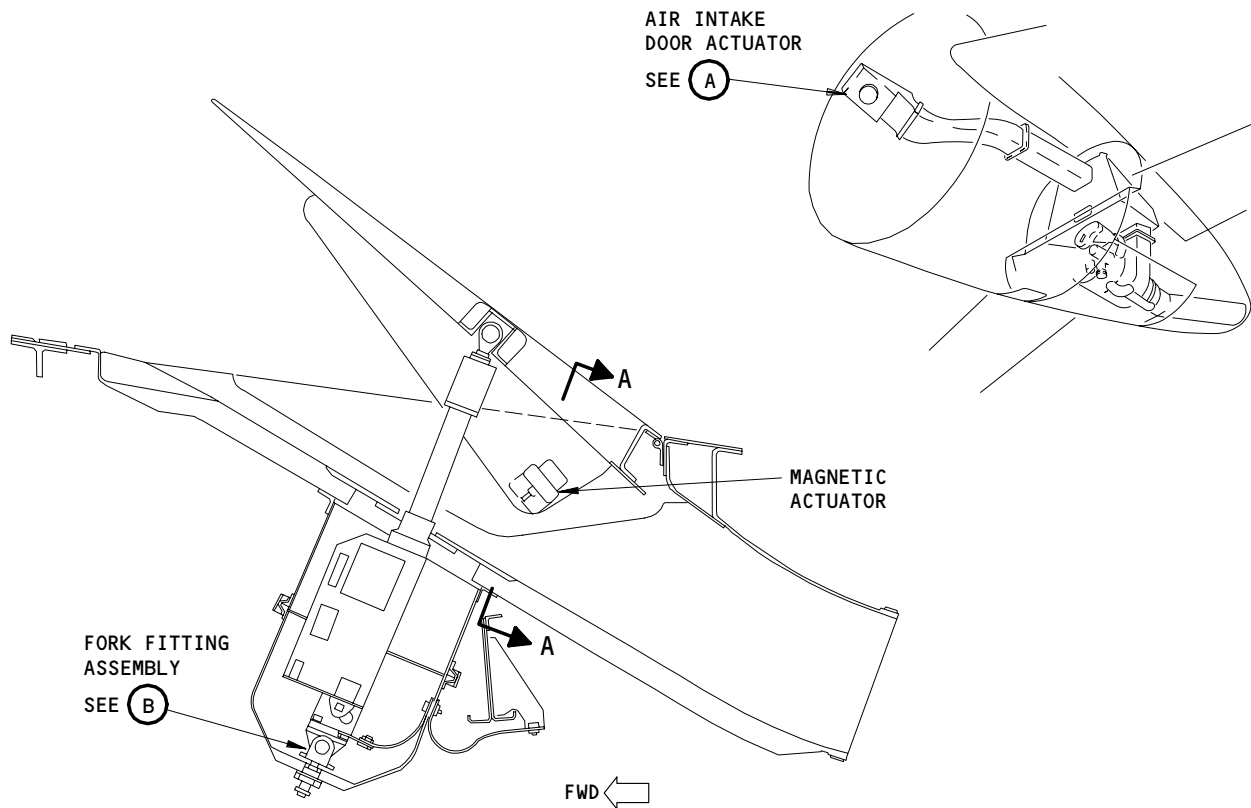
EFFECTIVITY

ALL

49-15-05

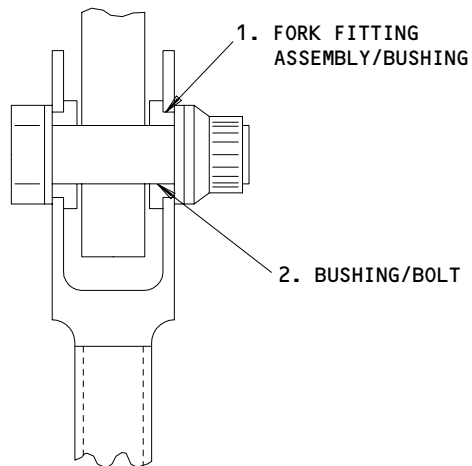
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Page 601  
Aug 22/01



AIR INTAKE DOOR ACTUATOR

(A)



FORK FITTING ASSEMBLY

(B)

Air Intake Door Limits  
Figure 601 (Sheet 1)

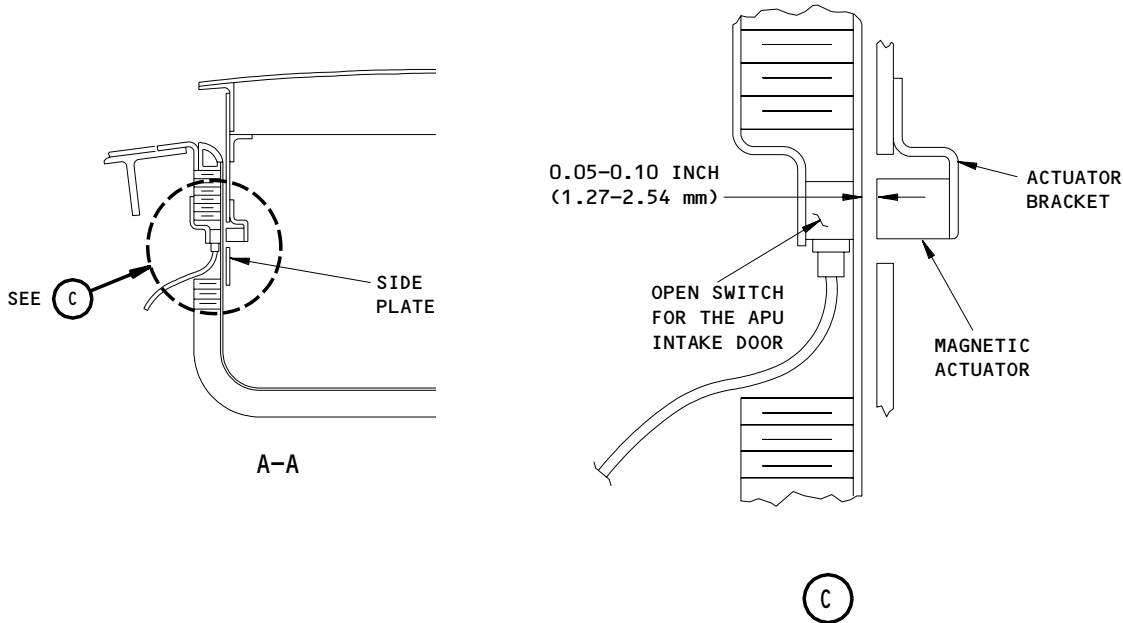
EFFECTIVITY	ALL
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49-15-05

01

Page 602  
May 10/94

121479



INDEX NO.	PART NAME	DIM.	DESIGN LIMITS		WEAR LIMITS		REPLACE WORN PART	REPAIR WORN PART	REPAIR INSTR
			DIAMETER		PERMITTED WEAR DIMENSION INCHES (mm)	MAXIMUM DIAMETER CLEARANCE INCHES (mm)			
			MINIMUM INCHES (mm)	MAXIMUM INCHES (mm)					
1	FORK FITTING ASSEMBLY	ID	0.4375 (11.113)	0.4381 (11.128)	0.0000	0.0000	X		
	BUSHING	OD	0.4381 (11.128)	0.4386 (11.140)			X		
2	BUSHING	ID	0.3125 (7.938)	0.3140 (7.976)	0.3203 (8.136)	0.0155 (0.394)	X		
	BOLT	OD	0.3110 (7.899)	0.3120 (7.925)	0.3048 (7.742)		X		

Air Intake Door Limits  
Figure 601 (Sheet 2)

EFFECTIVITY

ALL

49-15-05

- S 026-046
- (4) Do this task: Air Intake Door Removal (AMM 49-15-05/401).
- S 216-018
- (5) Do these steps to examine the air intake door:
- (a) Examine the connection between the actuator rod and the air intake door for a loose fit and cracks.
  - (b) Make sure the connection between the actuator rod and the air intake door does not have worn areas.
  - (c) Make sure the hinge components do not have worn areas.
  - (d) Examine the magnetic actuator installation on the right side plate of the air intake door.
  - (e) Look for corrosion on the rivets, the magnetic actuator and the shim.
  - (f) If you find any corrosion, replace the air intake door.
- S 226-034
- (6) Read the distance that you measured between the magnetic actuator and the inlet port sidewall.
- S 356-035
- (7) If the distance is not 0.05-0.10 inch, manually bend the right door side plate until the clearance is satisfactory.
- S 016-009
- (8) Do this task: Air Intake Door Actuator Removal (AMM 49-15-06/401).
- S 216-019
- (9) Examine the fork fitting assembly to make sure the worn areas are in the limits specified in Fig. 601.
- S 426-047
- (10) Do this task: Air Intake Door Actuator Installation (AMM 49-15-06/401).
- S 426-048
- (11) Do this task: Air Intake Door Installation (AMM 49-15-05/401).

EFFECTIVITY

ALL

49-15-05

01

Page 604  
Aug 22/01

AIR INTAKE DOOR ACTUATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure has these tasks:  
(1) A removal of the air intake door actuator  
(2) An installation of the air intake door actuator.
- B. The air intake door actuator is referred to as the actuator.

TASK 49-15-06-004-054

2. Air Intake Door Actuator Removal (Fig. 401, Fig. 401A, Fig. 402)

A. References

- (1) AMM 29-11-00/201, Main Hydraulic Systems  
(2) SSM 49-00-04  
(3) WDM 49-15-11

B. Access

(1) Location Zones

- |     |  |
|-----|--|
| 154 | Aft Cargo Compartment – Right              |
| 211 | Flight Compartment – Left                  |
| 212 | Flight Compartment – Right                 |
| 313 | Stabilizer Torsion Box Compartment – Left  |
| 314 | Stabilizer Torsion Box Compartment – Right |

(2) Access Panels

- |       |                      |
|-------|----------------------|
| 312AR | Service Access Door  |
| 314DR | Air Inlet Door Panel |
| 314ER | Air Inlet Door Panel |
| 822   | Aft Cargo Door       |

C. Procedure

S 864-002

- (1) Do this task: Remove the Hydraulic Power (AMM 29-11-00/201).

S 864-050

- (2) Make sure the L, C and R FLT CONTROL SHUTOFF TAIL switches on the P61 maintenance panel are OFF and attach DO-NOT-OPERATE tags.

S 864-048

- (3) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-006

- (4) Open these circuit breakers and attach DO-NOT-CLOSE tags:  
(a) P11 Overhead Panel  
1) 11B35, APU ALTN CONT

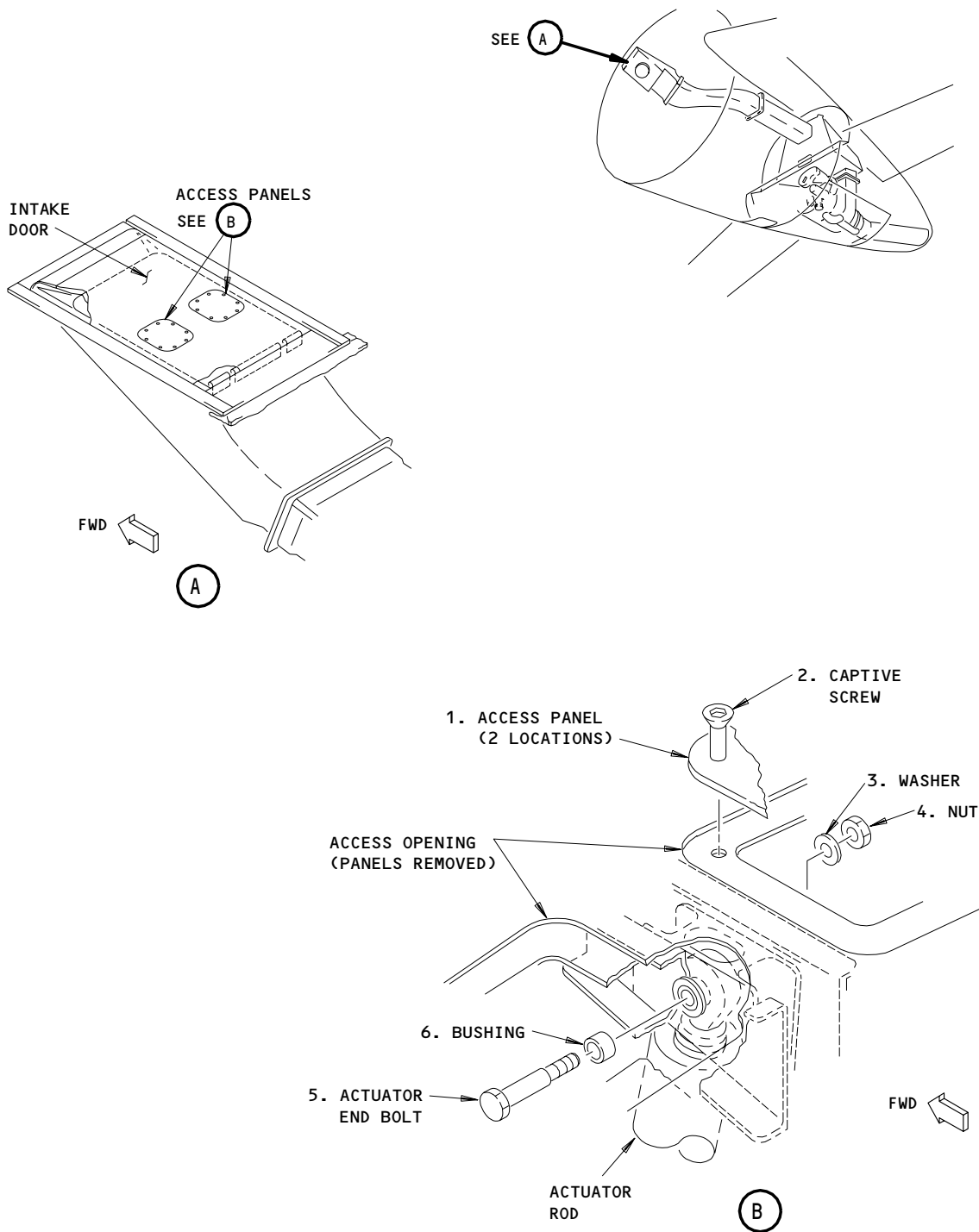
EFFECTIVITY

ALL

49-15-06

02

Page 401  
Aug 22/05

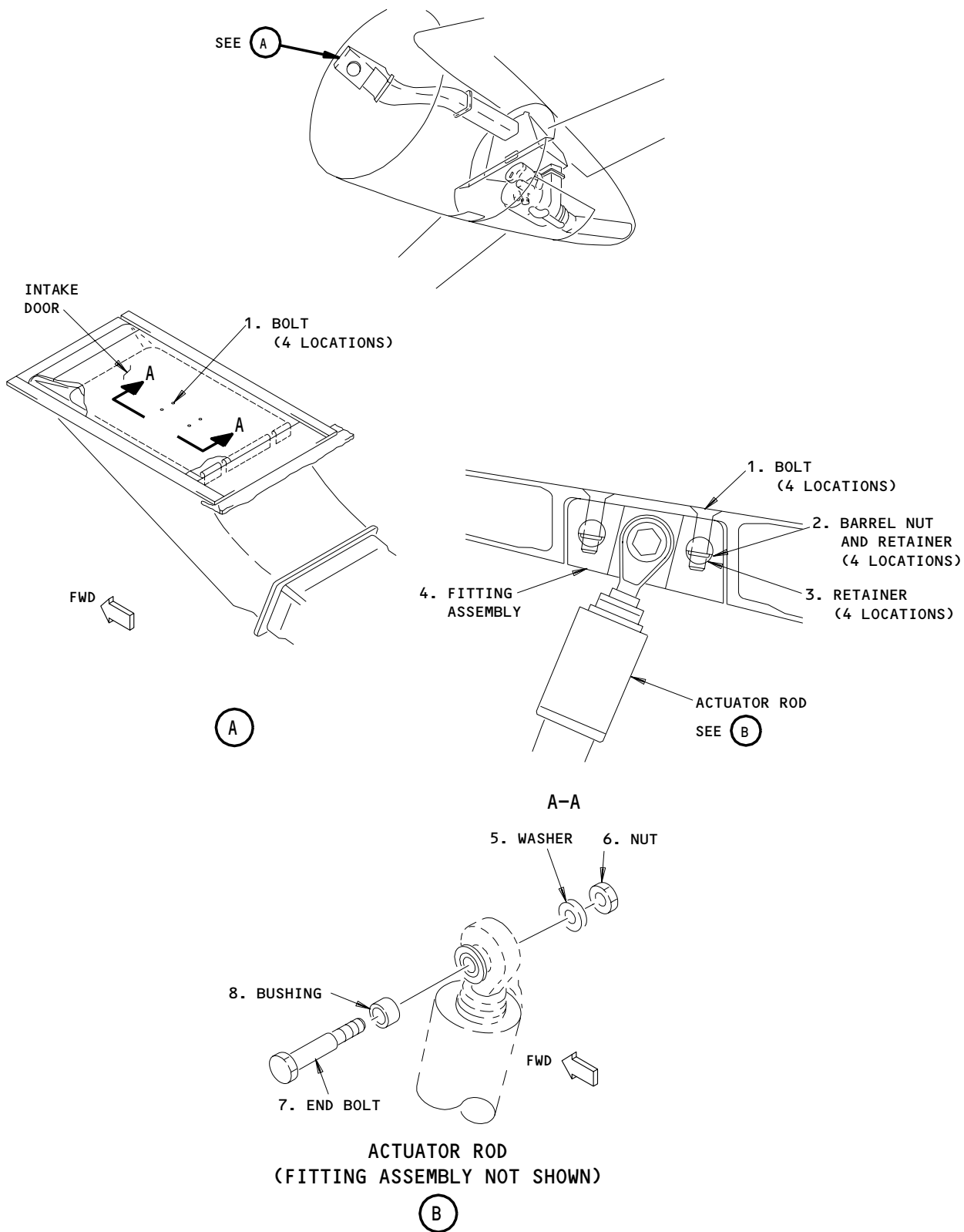


Air Intake Door Actuator Installation - Top Connection  
Figure 401

EFFECTIVITY  
AIRPLANES WITH THE TWO ACCESS PANELS ON  
THE AIR INTAKE DOOR

49-15-06





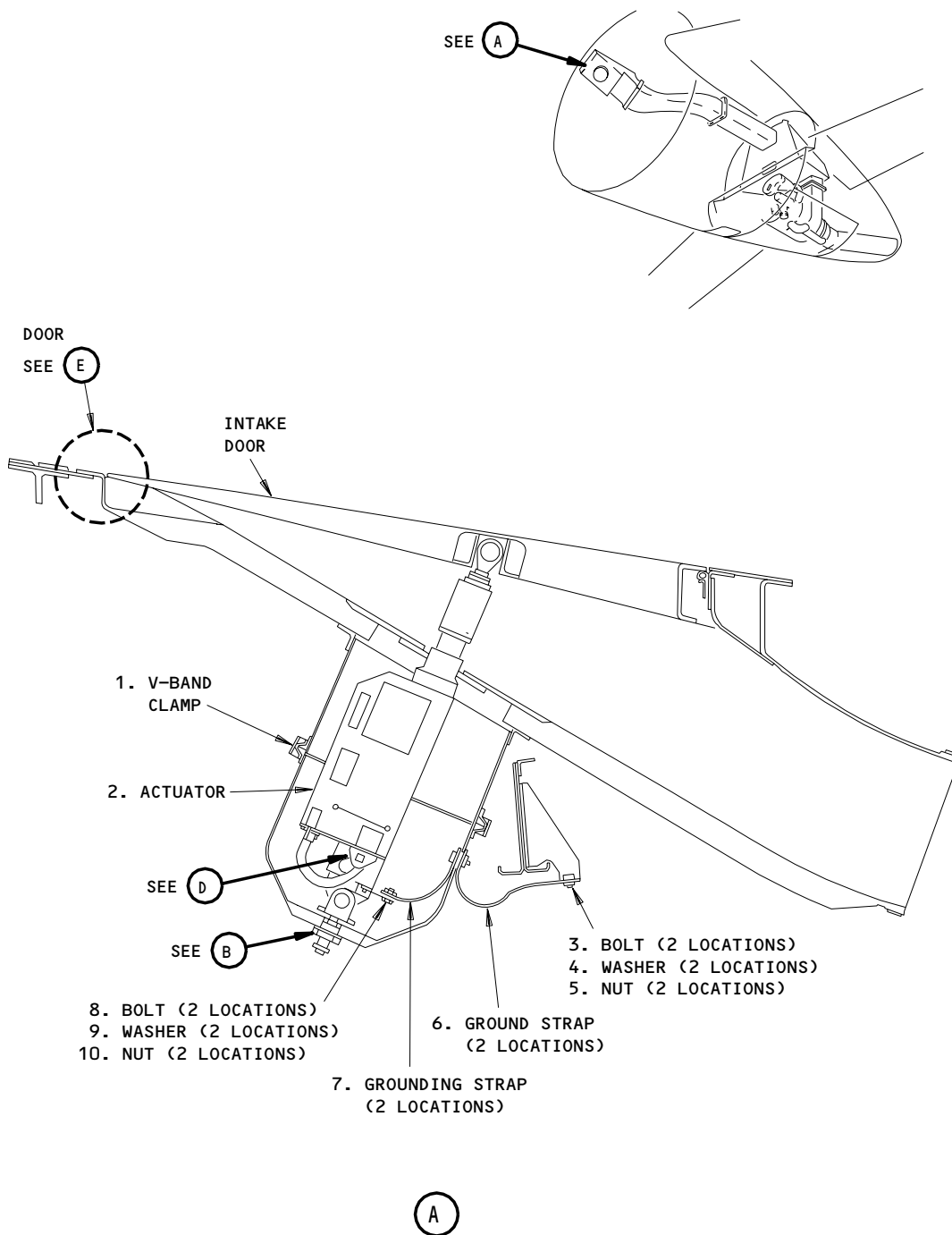
Air Intake Door Actuator Installation - Top Connection  
Figure 401A

EFFECTIVITY  
AIRPLANES WITHOUT THE TWO ACCESS PANELS  
ON THE AIR INTAKE DOOR

49-15-06

03

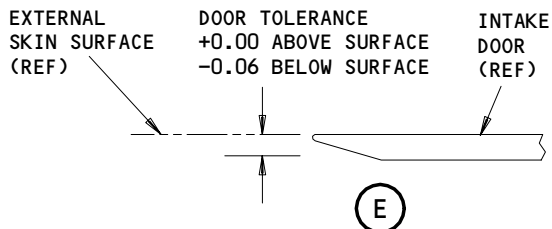
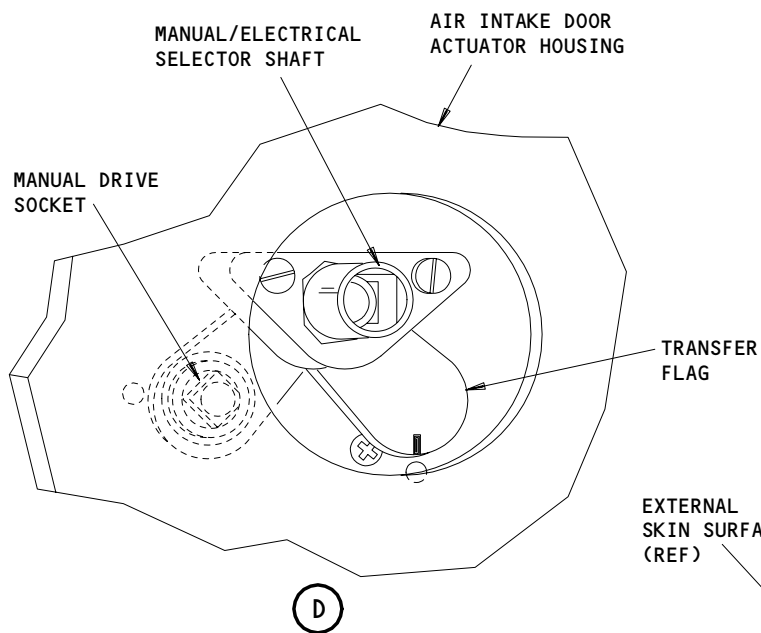
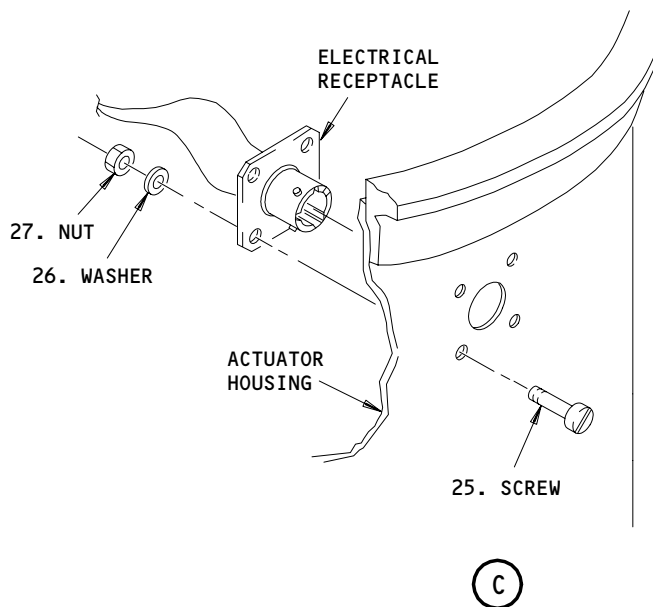
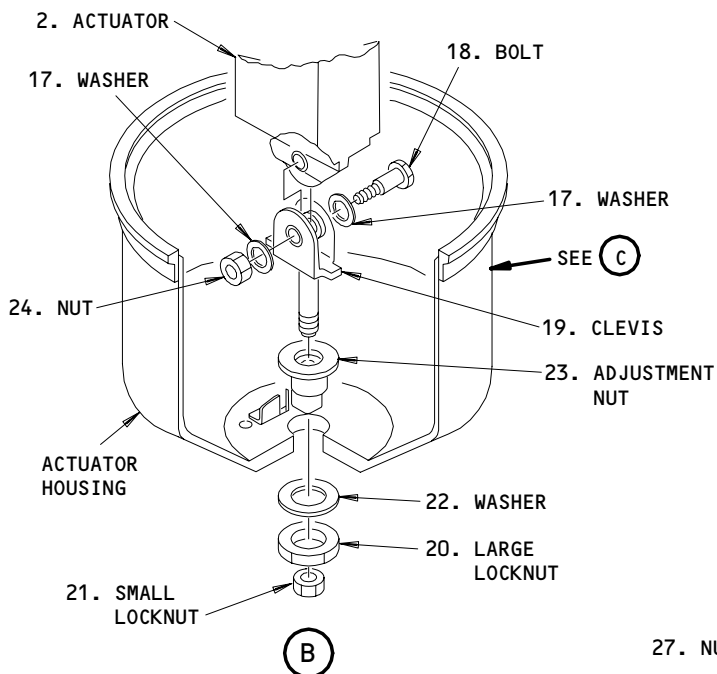
Page 403  
Apr 22/99



Air Intake Door Actuator Installation - Bottom Connection  
Figure 402 (Sheet 1)

EFFECTIVITY	
ALL	

49-15-06



Air Intake Door Actuator Installation - Bottom Connection  
Figure 402 (Sheet 2)

EFFECTIVITY	
	ALL

49-15-06

- 2) 11H17, L-FLT CONT SHUTOFF TAIL
- 3) 11H18, CTR-FLT CONT SHUTOFF TAIL
- 4) 11H27, R-FLT CONT SHUTOFF TAIL
- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
  - 3) 49C4, APU INLET DOOR ACTR

S 014-008

**WARNING:** THE CONTROLS ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT TO GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (5) Open the service access door, 312AR.

S 484-045

- (6) If it is necessary, install a service platform over the service access door, 312AR.

S 034-010

- (7) AIRPLANES WITH THE TWO ACCESS PANELS ON THE AIR INTAKE DOOR;  
Do these steps to disconnect the air intake door:
  - (a) Remove the captive screws (2) and the access panels (1) from the external surface of the air intake door.
  - (b) Remove the end bolt (5), the nut (4), the washer (3), and the bushing (6) from the actuator rod.
  - (c) Lift the door with your hand to disconnect the actuator from the air intake door.

S 034-011

- (8) AIRPLANES WITHOUT THE TWO ACCESS PANELS ON THE AIR INTAKE DOOR;  
Do these steps to disconnect the air intake door:
  - (a) Remove the four bolts (1) from the external surface of the air intake door.
  - (b) Lift the air intake door with your hand to get access to the actuator rod.
  - (c) Remove the end bolt (7), the washer (5), the nut (6), and the bushing (8) from the actuator rod.
  - (d) Remove the fitting assembly (4) from the actuator rod and keep it with the air intake door.

S 034-012

- (9) Do these steps to remove the actuator housing from the air intake port:
  - (a) Disconnect the electrical connector.
    - 1) Put caps on the electrical connectors.
  - (b) Remove the bolts (3), the washers (4), and the nuts (5) that attach the ground straps (6) to the airplane structure.

EFFECTIVITY

ALL

49-15-06

08

Page 406  
Aug 22/01

- (c) Remove the V-band clamp (1) from the actuator housing.
- (d) Remove the actuator housing from the air intake port.

S 024-013

- (10) Do these steps to remove the actuator from the actuator housing:

**CAUTION:** DO NOT PULL ON THE ELECTRICAL WIRES BETWEEN THE ACTUATOR AND THE HOUSING. IF YOU PULL ON THE WIRE, YOU CAN CAUSE DAMAGE TO THE WIRE, THE RECEPTACLE, OR THE ACTUATOR.

- (a) Remove the screws (25), the nuts (27), and the washers (26) from the electrical receptacle on the actuator housing.
- (b) Remove the nut (24), the washers (17), and the bolt (18) that attach the actuator (2) to the housing.
- (c) Remove the bolts (8), the washers (9), and the nuts (10) that attach the ground straps (7) to the actuator.
- (d) Remove the actuator (2) from the actuator housing.

S 034-014

- (11) If it is necessary, remove the clevis (19) from the actuator housing.

**NOTE:** Do not move the clevis from its position unless it is necessary to replace the actuator housing.

- (a) Remove the small locknut (21), the large locknut (20), and the washer (22) from the end of the clevis (19).

TASK 49-15-06-404-055

3. Air Intake Door Actuator Installation (Fig. 401, Fig. 401A, Fig. 402)

A. References

- (1) SWPM 20-20-00, Electrical Bonding
- (2) AMM 29-11-00/201, Main Hydraulic Systems
- (3) AMM 49-15-06/501, APU Air Intake Door Actuator
- (4) SSM 49-00-04

EFFECTIVITY

ALL

49-15-06

03

Page 407  
Aug 22/05

(5) WDM 49-15-11

**B. Equipment**

- (1) Ohmmeter (or alternative tool)
  - (a) C15292 Ohmmeter - Electrical Bonding (also called T477W)  
(recommended) Avtron Mfg. Inc. 10409 Meech Ave., Cleveland,  
OH 44105-4166
  - (b) Model 1010-A Micro-Ohmmeter - Autoranging/Autotest, 10  
Micro-ohms to 200 Ohms, Accuracy: 0.05% (alternative)  
Barberree Custom Design 1401 Laurier House, 1600 Beach Ave.,  
Vancouver, BC Canada V6G 1Y6, DC

**C. Parts**

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
402	2	Actuator Assembly (Air Intake Door Actuator)	49-15-05	01 02	280 or 400

**D. Access**

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 313 Stabilizer Torsion Box Compartment - Left
- 314 Stabilizer Torsion Box Compartment - Right

(2) Access Panels

- 312AR Service Access Door
- 314DR Air Inlet Door Panel
- 314ER Air Inlet Door Panel
- 822 Aft Cargo Door

**E. Procedure**

S 434-016

- (1) If the clevis (19) was removed from the housing, do these steps to install the clevis:
  - (a) Install the adjustment nut (23) on the clevis (19) and put them in the housing.
  - (b) Install the washer (22), the large locknut (20), and the small locknut (21) to attach the clevis to the housing.

S 424-017

- (2) Do these steps to install the actuator in the actuator housing:
  - (a) Connect the ground straps (7) to the actuator with the bolts (8), the washers (9), and the nuts (10).
  - (b) Connect the actuator to the clevis (19) with the bolt (18), the washers (17), and the nut (24).

EFFECTIVITY

ALL

**49-15-06**

03

Page 408  
Aug 22/05

- (c) Connect the ground straps (6 and 7) to the side of the actuator housing with the bolts (8), the washers (9), and the nuts (10).
- (d) Attach the electrical receptacle to the actuator housing with the screws (25), the nuts (27), and the washers (26).

S 434-018

- (3) Attach the actuator and the actuator housing to the air intake port with the V-band clamp.

NOTE: Do not tighten the V-band clamp at this time.

S 434-020

- (4) AIRPLANES WITH THE TWO ACCESS PANELS ON THE AIR INTAKE DOOR;  
Do these steps to connect the air intake door:
  - (a) Attach the actuator to the air intake door with the bolt (5), the bushing (6), the washer (3), and the nut (4).
  - (b) Attach the two access panels (1) to the air intake door with the captive screws (2).

S 434-021

- (5) AIRPLANES WITHOUT THE TWO ACCESS PANELS ON THE AIR INTAKE DOOR;  
Do these steps to connect the air intake door:
  - (a) Lift the air intake door with your hand to get access to the actuator rod.
  - (b) Attach the fitting assembly (4) to the actuator rod with the end bolt (7), the bushing (8), the washer (5), and the nut (6).
  - (c) Align the fitting assembly (4) with the air intake door and close the door.
  - (d) Install the bolts (1) on the external surface of the air intake door.
  - (e) Tighten the V-band clamp (1) to 160-180 inch-pounds (18.1-20.3 newton-meters).
  - (f) Connect the ground straps (6) to the airplane structure with the bolts (3), the washers (4), and the nuts (5).

S 764-024

- (6) Make sure the bonding resistance between the housing and the airplane structure is not more than 0.001 ohm (SWPM 20-20-00).

EFFECTIVITY

ALL

49-15-06

03

Page 409  
Aug 22/05

S 434-025

- (7) Connect the electrical connector to the actuator.  
(a) Install a lockwire on the electrical connector.

S 224-026

- (8) Make sure the air intake door is in the tolerance shown on Fig. 402 when the door is fully closed.

S 824-027

- (9) If the air intake door is not in the tolerance limits, adjust the actuator (AMM 49-15-06/501).

S 984-028

- (10) Do a check of the actuator operation:

**CAUTION:** MAKE SURE THE TRANSFER FLAG IS COMPLETELY IN THE MANUAL POSITION OR YOU CAN CAUSE DAMAGE TO THE ACTUATOR.

DO NOT TURN THE MANUAL/ELECTRICAL SELECTOR SHAFT OR THE MANUAL DRIVE IF THERE IS TOO MUCH TORQUE. IF YOU SUPPLY TOO MUCH TORQUE, YOU CAN CAUSE DAMAGE TO THE ACTUATOR. SEE THE OPERATION PLACARD ON THE ACTUATOR.

- (a) Put a 1/4-inch square drive into the manual/electrical selector shaft.  
1) Push the square drive in and turn the socket counterclockwise (about 100°) until you can see the manual drive socket.

**NOTE:** Do not apply more than 10 inch-pounds (1.12 newton-meters) of torque.

- (b) Put a square drive into the manual drive socket and turn counterclockwise (to extend the actuator) until you feel a sudden increase of torque.

**NOTE:** Do not apply more than 65 inch-pounds (7.34 newton-meters) of torque.

EFFECTIVITY

ALL

49-15-06

03

Page 410  
Aug 22/01



- (c) Turn the manual drive socket clockwise (to retract the actuator) until you feel a sudden increase of torque.
- (d) Put the square drive into manual/electrical selector shaft.
  - 1) Push the square drive in and turn the socket clockwise until you cannot see the socket any more.

S 214-029

- (11) Make sure you remove all the tools and materials from the inlet plenum and the air intake door.

S 084-052

- (12) If the service platform was installed over the service access door, 312AR, remove the service platform.

S 414-053

- (13) Close the service access door, 312AR.

S 864-031

- (14) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
    - 3) 49C4, APU INLET DOOR ACT
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
    - 2) 11H17, L-FLT CONT SHUTOFF TAIL
    - 3) 11H18, CTR-FLT CONT SHUTOFF TAIL
    - 4) 11H27, R-FLT CONT SHUTOFF TAIL

S 864-049

- (15) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 864-051

- (16) Remove the DO-NOT-OPERATE tags from the L, C and R FLT CONTROL SHUTOFF TAIL switches on the P61 maintenance panel.

EFFECTIVITY

ALL

49-15-06

04

Page 411  
Aug 22/01

S 864-036

- (17) If it is necessary supply hydraulic pressure to the left system, the right system, and the center system (AMM 29-11-00/201).

S 714-037

- (18) Put the APU master control switch on the P5 overhead panel to the ON position to make sure all of the components of the air intake door system operate correctly.

S 864-038

- (19) Put the APU master control switch on the P5 overhead panel in the OFF position.

EFFECTIVITY

ALL

49-15-06

03

Page 412  
Aug 22/00

AIR INTAKE DOOR ACTUATOR – ADJUSTMENT/TEST

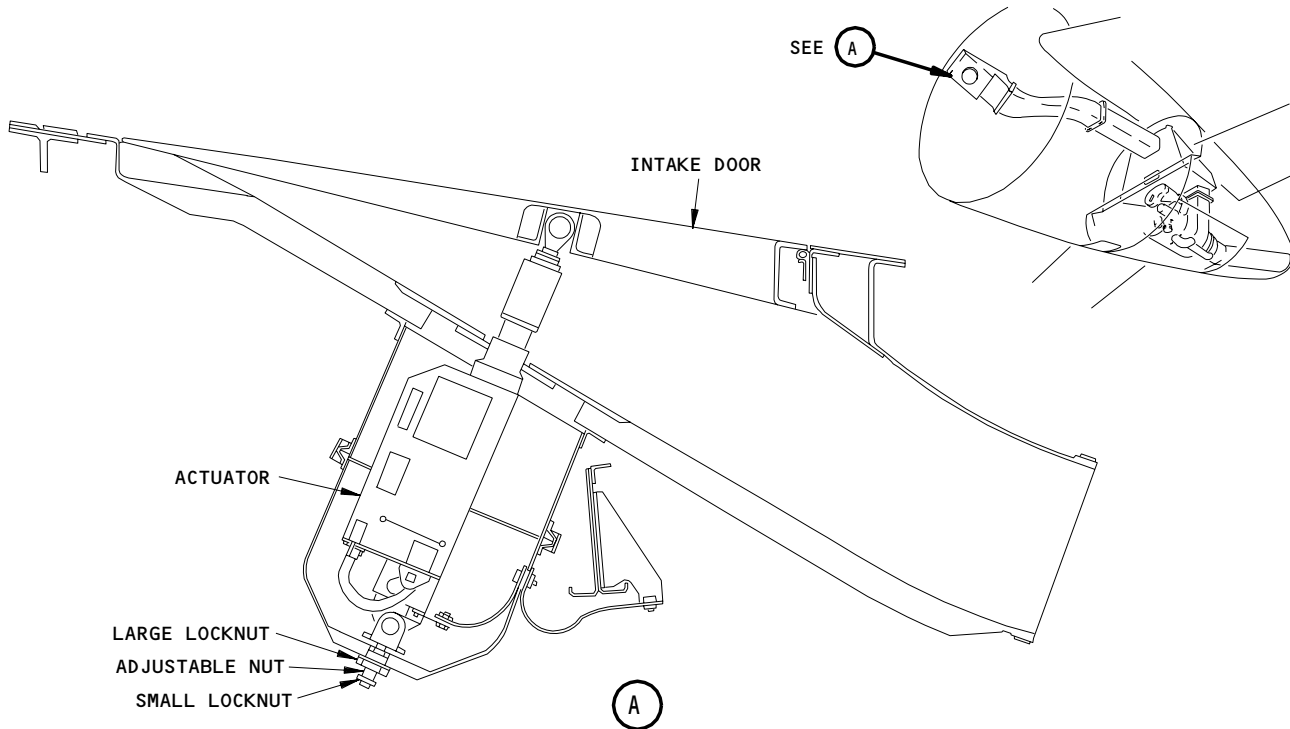
1. General

- A. This procedure has the task to adjust the actuator for the air intake door.
- B. The air intake door actuator is referred to as the actuator.
- C. It is necessary to adjust the actuator if the intake door and the airplane skin surface are not within the door limits (tolerance).

TASK 49-15-06-805-001

2. Air Intake Door Actuator Adjustment (Fig. 501)

- A. References
  - (1) AMM 29-11-00/201, Main Hydraulic (Left, Right and Center) System
- B. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 313 Stabilizer Torsion Box Compartment – Left
    - 314 Stabilizer Torsion Box Compartment – Right
  - (2) Access Panels
    - 312AR Service Access Door
    - 822 Aft Cargo Door



Air Intake Door Actuator Adjustment  
Figure 501

EFFECTIVITY	
	ALL

**49-15-06**

01

Page 501  
Aug 22/01

130652

C. Procedure

S 865-017

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 865-016

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Circuit Breaker Panel
    - 1) 11B35, APU ALTN CONT
    - 2) 11H17, L-FLT CONT SHUTOFF TAIL
    - 3) 11H18, CTR-FLT CONT SHUTOFF TAIL
    - 4) 11H27, R-FLT CONT SHUTOFF TAIL
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
    - 3) 49C4, APU INLET DOOR ACT

S 865-010

- (3) Do this task: Remove the Hydraulic Power (AMM 29-11-00/201).

S 865-018

- (4) Make sure the L, C and R FLT CONTROL SHUTOFF TAIL switches on the P61 maintenance panel are OFF and attach DO-NOT-OPERATE tags.

S 015-012

**WARNING:** THE SERVICE ACCESS DOOR MUST NOT BE USED TO HOLD YOUR WEIGHT TO GET ACCESS TO THE STABILIZER TORSION BOX COMPARTMENT. YOUR WEIGHT CAN RELEASE THE SPRING-LOADED LATCHES. INJURY TO PERSONNEL CAN OCCUR.

- (5) Open the service access door, 312AR.

S 485-011

- (6) If it is necessary, install a service platform over the service access door, 312AR.

S 825-005

- (7) Do these steps to adjust the intake door actuator:
  - (a) If the air intake door is open, close the door.

**CAUTION:** DO NOT TRY TO ADJUST THE ACTUATOR AT THE END OF THE ROD THAT ATTACHES THE ACTUATOR TO THE DOOR. DAMAGE TO THE ACTUATOR CAN OCCUR.

- (b) Loosen the small and the large locknuts at the bottom of the actuator housing.
- (c) Turn the adjustable nut as it is necessary to align the door with the fuselage skin in a tolerance of +0.00/-0.06 inch.

EFFECTIVITY

ALL

49-15-06

03

Page 502  
Apr 22/09

- (d) Tighten the small and the large locknuts at the bottom of the actuator housing.
- D. Put the airplane back to its usual condition

S 085-013

- (1) If the service platform was installed over the service access door, 312AR, remove the service platform.

S 415-006

- (2) Close the service access door, 312AR.

S 865-014

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) P49 APU Auxiliary Panel
- 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
  - 3) 49C4, APU INLET DOOR ACT
- (b) P11 Overhead Circuit Breaker Panel
- 1) 11B35, APU ALTN CONT
  - 2) 11H17, L-FLT CONT SHUTOFF TAIL
  - 3) 11H18, CTR-FLT CONT SHUTOFF TAIL
  - 4) 11H27, R-FLT CONT SHUTOFF TAIL

S 865-015

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 865-019

- (5) Make sure the L, C and R FLT CONTROL SHUTOFF TAIL switches on the P61 maintenance panel are ON and remove DO-NOT-OPERATE tags.

S 865-008

- (6) Do this task: Pressurize the Main (Left, Right, and Center) Hydraulic Systems (AMM 29-11-00/201).

EFFECTIVITY

ALL

49-15-06

03

Page 503  
Apr 22/08

AIR INTAKE DOOR SEAL – REMOVAL/INSTALLATION

1. General

- A. This procedure has these tasks:
  - (1) A removal of the air intake door seal
  - (2) An installation of the air intake door seal.
- B. The air intake door seal is referred to as the seal.

TASK 49-15-07-004-001

2. Air Intake Door Seal Removal (Fig. 401)

- A. References
  - (1) AMM 49-15-05/401, APU Air Intake Door
- B. Access
  - (1) Location Zones
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right

C. Procedure

S 014-002

- (1) Do this task: Air Intake Door Removal (AMM 49-15-05/401).

S 024-003

- (2) Do these steps to remove the seals (3,4, and 5):
  - (a) Remove the bolts (7 and 10), the washers (6), and the retainers (2, 8, and 9) that attach the seals (3, 4, and 5) to the air intake port (1).
  - (b) Remove the seals (3, 4, and 5) from the air intake port (1).

TASK 49-15-07-404-004

3. Air Intake Door Seal Installation (Fig. 401)

- A. References
  - (1) AMM 49-15-05/401, APU Air Intake Door
- B. Consumable Materials
  - (1) G01912 Lockwire, Monel (0.032 Inch Diameter) – NASM20995NC32

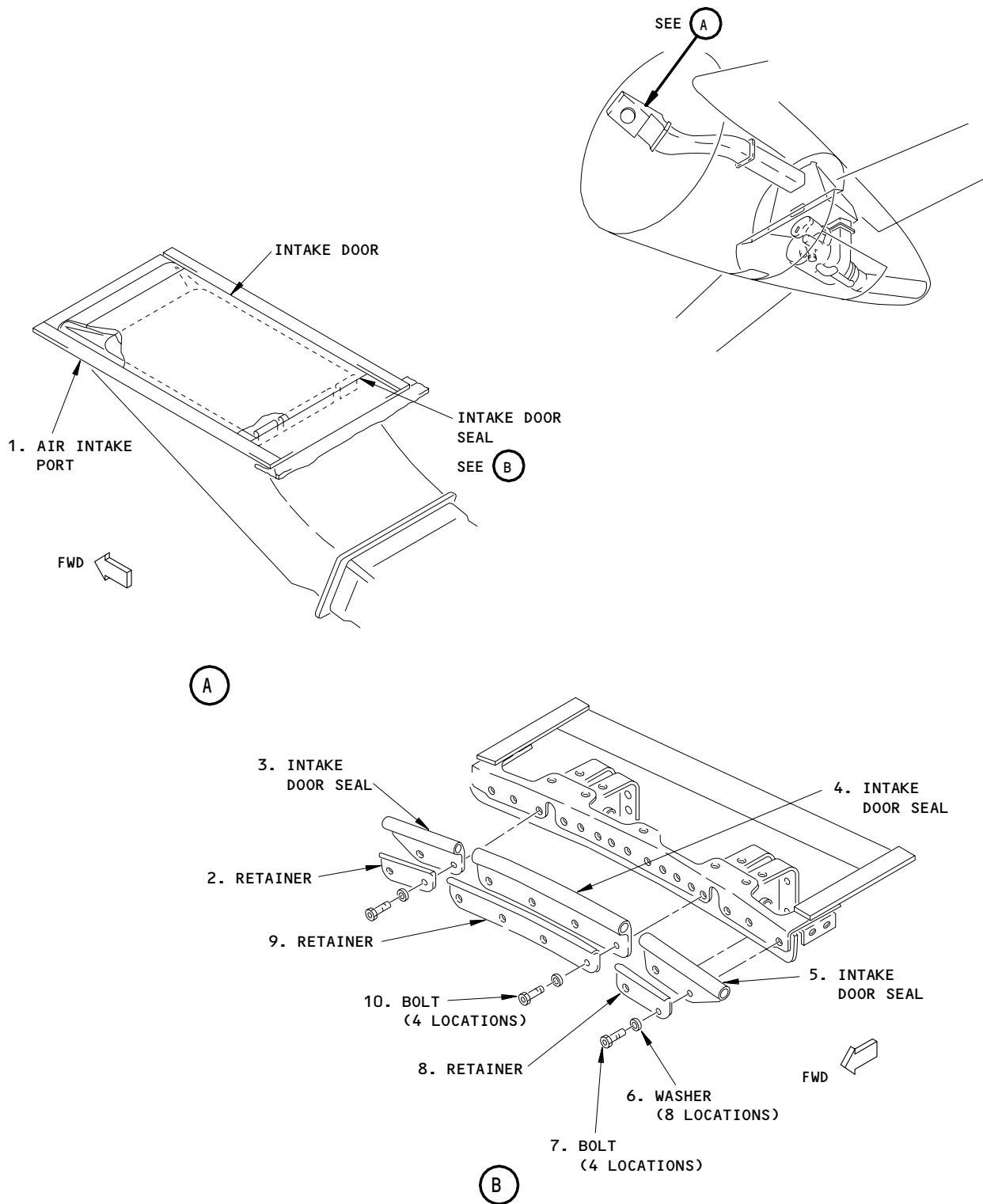
EFFECTIVITY

ALL

49-15-07

01

Page 401  
Apr 22/06



Air Intake Door Seal Installation  
Figure 401

EFFECTIVITY

ALL

49-15-07

02

Page 402  
Apr 22/99

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Seal (Intake Door Seal)	49-15-05	01	201 or
	4	Seal (Intake Door Seal)		02	305
	5	Seal (Intake Door Seal)		01	202 or
				02	310
				01	203 or
				02	315

D. Access

(1) Location Zones

- 211 Flight Compartment - Left
- 212 Flight Compartment - Right

E. Procedure

S 424-005

- (1) Do these steps to install the seals (3, 4, and 5) on the air intake port:
- (a) Put the seals (3, 4, and 5) and the retainers (2, 8, and 9) in their positions on the air intake port (1).
  - (b) Install the bolts (7 and 10) and the washers (6) that attach the retainers (2, 8, and 9) to the air intake port (1).
  - (c) Tighten the bolts (7 and 10) to 30-35 inch-pounds (3.4-4.0 newton-meters).
  - (d) Install lockwire on the bolts (7 and 10).

S 414-006

- (2) Do this task: Air Intake Door Installation (AMM 49-15-05/401).

EFFECTIVITY

ALL

49-15-07

01

Page 403  
Aug 22/05



AIR INTAKE PORT - REMOVAL/INSTALLATION

1. General

A. This procedure has these tasks:

- (1) A removal of the air intake port
- (2) An installation of the air intake port.

TASK 49-15-08-004-001

2. Air Intake Port Removal (Fig. 401)

A. References

- (1) AMM 49-15-01/401, Air Intake Duct
- (2) AMM 49-15-02/401, Air Intake Door Open Switch
- (3) AMM 49-15-05/401, Air Intake Door
- (4) AMM 49-15-06/401, Air Intake Door Actuator

B. Access

(1) Location Zones

- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 313 Stabilizer Torsion Box Compartment - Left
- 314 Stabilizer Torsion Box Compartment - Right

(2) Access Panels

- 312AR Service Access Door

C. Procedure

S 014-002

- (1) Do this task: Air Intake Door Open Switch Removal (AMM 49-15-02/401).

S 014-003

- (2) Do this task: Air Intake Door Actuator Removal (AMM 49-15-06/401).

S 014-004

- (3) Do this task: Air Intake Door Removal (AMM 49-15-05/401).

S 024-005

- (4) Do these steps to remove the air intake port (3):
  - (a) Remove the bolts (1) that attach the air intake port (3) to the fuselage.

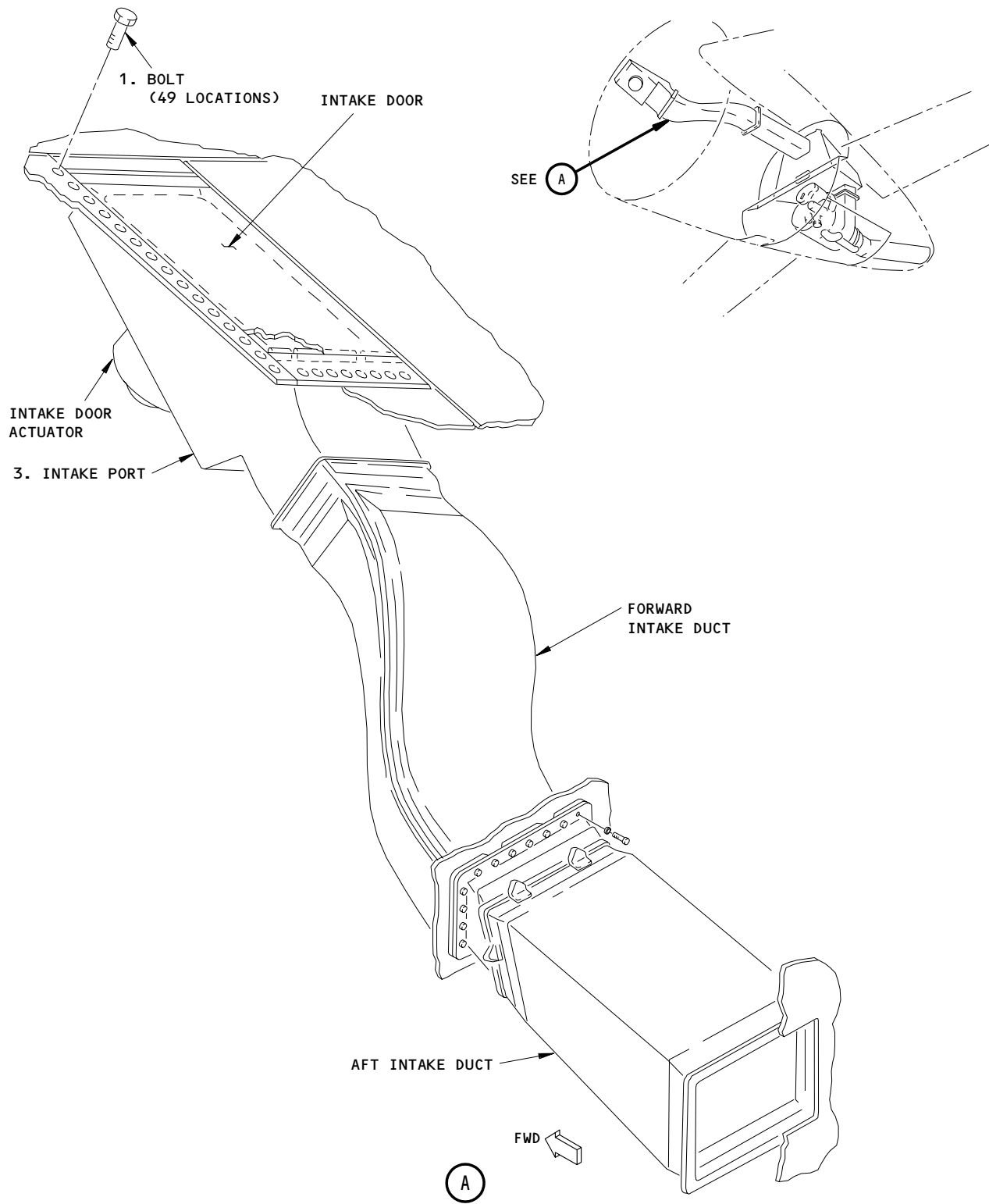
EFFECTIVITY

ALL

49-15-08

01

Page 401  
Dec 22/08



Air Intake Port Installation  
Figure 401

EFFECTIVITY	
	ALL

49-15-08

01

Page 402  
Aug 22/07

- (b) Remove the forward intake duct (AMM 49-15-01/401).
- (c) Carefully lift and pull the air intake port (3) forward to disconnect the air intake port from the forward intake duct.

**NOTE:** It is recommended that you use two persons to remove the air intake port. The location of the first person is on the outside of the airplane and near the air intake door. The location of the second person is in the stabilizer torsion box compartment and near the air intake port.

- (d) Remove the air intake port (3).

TASK 49-15-08-404-006

3. Air Intake Port Installation (Fig. 401)

A. References

- (1) AMM 49-15-01/401, Air Intake Duct
- (2) AMM 49-15-02/401, Air Intake Door Open Switch
- (3) AMM 49-15-05/401, Air Intake Door
- (4) AMM 49-15-06/401, Air Intake Door Actuator
- (5) AMM 49-15-06/501, Air Intake Door Actuator

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Port Assembly (Air Intake Port)	49-15-05	01 02	165 or 170

C. Access

(1) Location Zones

- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 313 Stabilizer Torsion Box Compartment - Left
- 314 Stabilizer Torsion Box Compartment - Right

(2) Access Panels

- 312AR Service Access Door

EFFECTIVITY

ALL

**49-15-08**

01

Page 403  
Aug 22/05

D. Procedure

S 424-007

- (1) Do these steps to install the air intake port (3):

**NOTE:** It is recommended that you use two persons to install the air intake port. The location of the first person is on the outside of the airplane and near the air intake door. The location of the second person is in the stabilizer torsion box compartment and near the air.

- (a) Put the air intake port (3) in its position on the airplane.  
(b) Install the forward intake duct (AMM 49-15-01/401).  
(c) Install the bolts (1) that attach the air intake port (3) to the fuselage.

S 414-008

- (2) Do this task: Air Intake Door Installation (AMM 49-15-05/401).

S 414-009

- (3) Do this task: Air Intake Door Actuator Installation (AMM 49-15-06/401).

S 824-010

- (4) If it is necessary, do this task: Air Intake Door Actuator Adjustment (AMM 49-15-06/501).

S 414-011

- (5) Do this task: Air Intake Door Open Switch Installation (AMM 49-15-02/401).

EFFECTIVITY

ALL

**49-15-08**

02

Page 404  
Aug 22/07

AIR INTAKE PORT SEAL – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the following tasks:  
(1) A removal of the air intake port seal  
(2) An installation of the air intake port seal.

TASK 49-15-09-004-001

2. Air Intake Port Seal Removal (Fig. 401)

A. References

- (1) AMM 49-15-05/401, Air Intake Door

B. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment – Right |
| 211 | Flight Compartment – Left     |
| 212 | Flight Compartment – Right    |

C. Procedure

S 024-016

- (1) Do this task: Air Intake Door Removal (AMM 49-15-05/401).

S 024-004

- (2) AIR INTAKE PORT SEAL WITH FASTENING BOLTS;

Do these steps to remove the intake port seal (2):

- (a) Remove the adhesive from the bolt holes.  
(b) Remove the bolts (1) that attach the intake port seal (2) to the air intake port (3).  
(c) Remove the intake port seal (2) from the air intake port (3).

S 024-005

- (3) AIR INTAKE PORT SEAL WITHOUT THE FASTENING BOLTS;  
Remove the seal (2) from air intake port (3).

TASK 49-15-09-404-006

3. Air Intake Port Seal Installation (Fig. 401)

A. Consumable Materials

- (1) A00179 Base – Adhesive, BAC 5010, 93-076

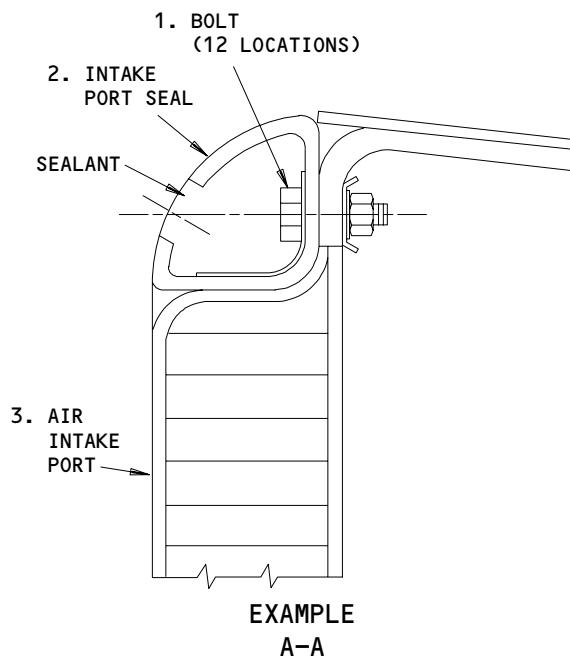
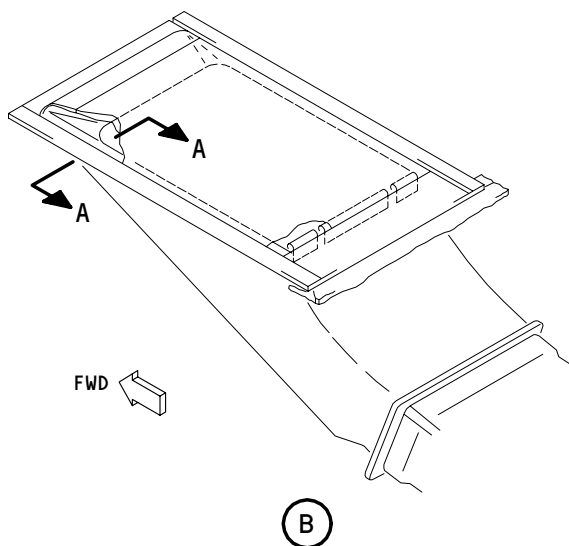
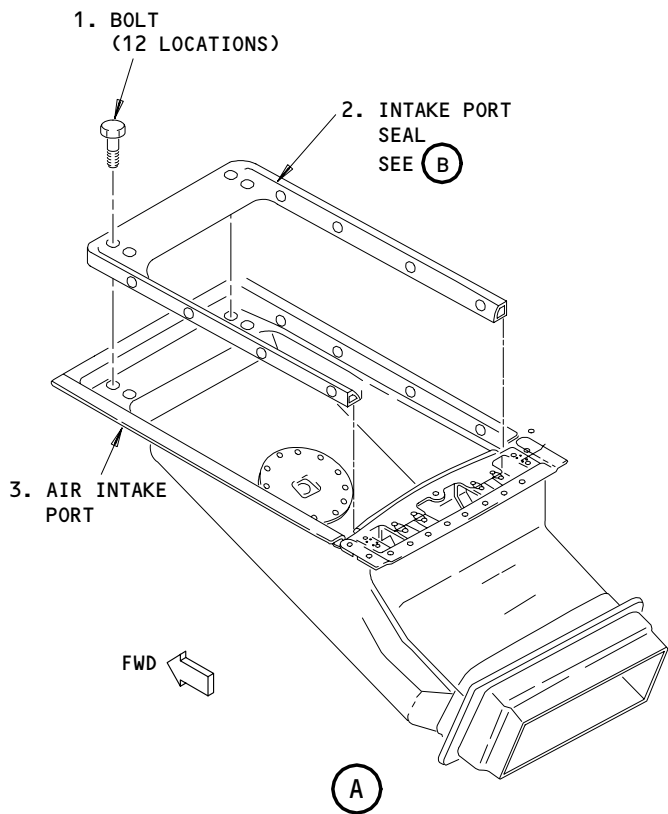
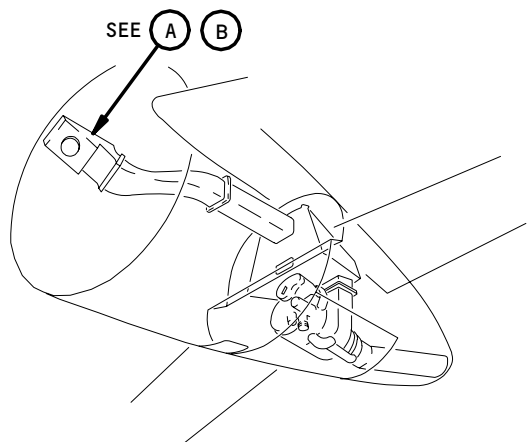
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49-15-09

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Page 401  
Aug 22/09



Air Intake Port Seal Installation  
Figure 401 (Sheet 1)

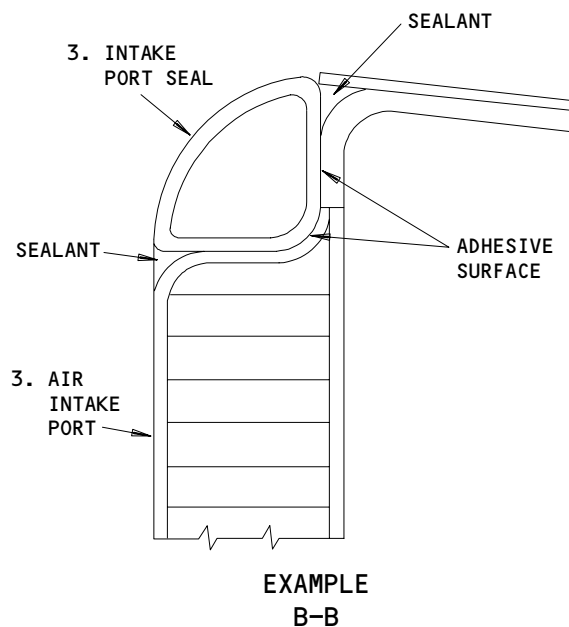
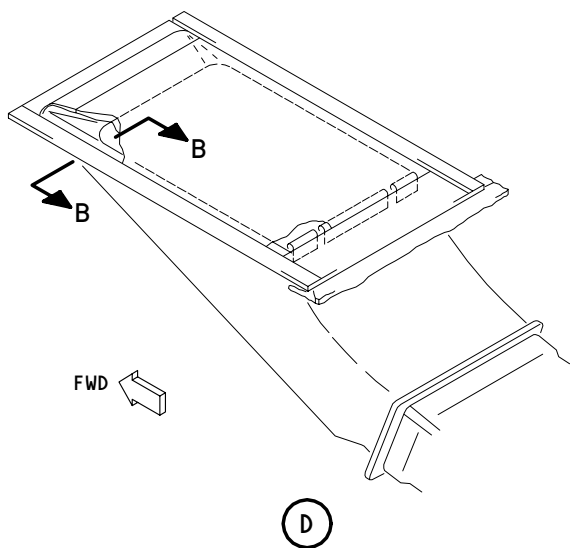
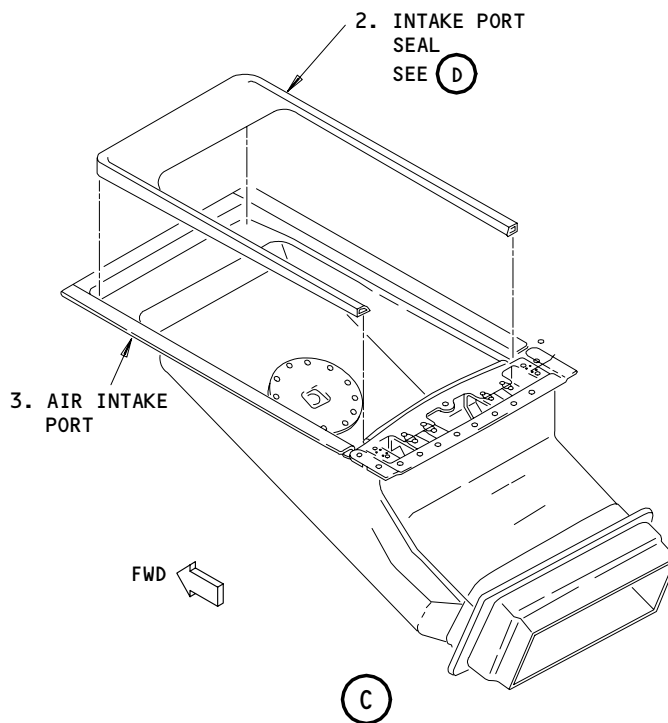
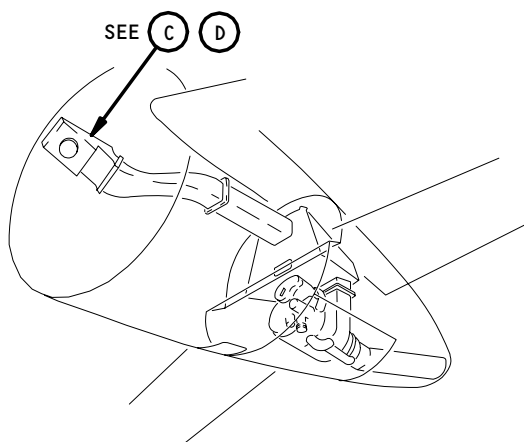
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AIR INTAKE PORT SEAL WITH THE  
FASTENING BOLTS

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49-15-09

04

Page 402  
Apr 22/99



Air Intake Port Seal Installation  
Figure 401 (Sheet 2)

EFFECTIVITY  
AIR INTAKE PORT SEAL WITHOUT  
THE FASTENING BOLTS

49-15-09

02

Page 403  
Apr 22/99

- (2) A00180 Catalyst - Adhesive, BAC 5010, 93-076-2
- (3) A00075 Primer - Adhesive, BAC 5010, DC-1204

(4) G01043 Cloth - Lintfree

**B. References**

- (1) AMM 49-15-05/401, APU Air Intake Door

**C. Parts**

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Door Seal Assembly (Air Intake Port Seal)	49-15-05	01 02	191 or 245

**D. Access**

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right

(2) Access Panels

- 822 Aft Cargo Door

**E. Procedure**

S 424-008

(1) AIR INTAKE PORT SEAL WITH FASTENING BOLTS;

Do these steps to install the intake port seal (2):

- (a) Put the intake port seal (2) in its position on the air intake port (3).
- (b) Install the bolts (1) that attach the intake port seal (2) to the air intake port (3).
- (c) Mix the base, the catalyst, and the primer to make the BAC 5010 adhesive.

EFFECTIVITY

ALL

**49-15-09**

04

Page 404  
Dec 22/08



(d) Smoothly seal the bolt holes with the adhesive.

S 424-009

- (2) AIR INTAKE PORT SEAL WITHOUT FASTENING BOLTS;  
Install the intake port seal (2):

**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 AND LOCAL REQUIREMENTS FOR PROPER HANDLING PROCEDURES.

- (a) Clean the intake port (3) surface that touches the intake port seal (2) with a lintfree cloth made moist with solvent, Series 89 (AMM 20-30-89/201).
- (b) Immediately dry the intake port (3) surface with a different lintfree cloth.
- (c) Apply a thin symmetrical layer of the primer to the intake port (3) surface that touches the intake port seal (2).
- (d) Let the primer dry in the air for a minimum of 60 minutes and a maximum of 24 hours.
- (e) Apply a symmetrical layer of the adhesive to the intake port (3) surface that touches the intake port seal (2).
- (f) Attach the intake port seal (2) to the intake port (3) with sufficient pressure to remove the air inclusions.

**NOTE:** Do not use too much pressure to install the seal. A bond line thickness of 0.020 inch (0.5 mm) is necessary to get the sufficient strength.

- (g) Apply the sealant in the spaces between the intake port seal (2) and the air intake port (3).
- (h) Let the adhesive and the sealant dry for a minimum cure time of 24 hours at 65°-100°F (18.3°-37.8°C) before you move the parts.

EFFECTIVITY

ALL

49-15-09

01

Page 405  
Dec 22/08

- S 424-015  
(3) Do this task: Air Intake Door Installation (AMM 49-15-05/401).

EFFECTIVITY

ALL

**49-15-09**

03

Page 406  
Apr 22/99

APU DRAINS AND VENTS – DESCRIPTION AND OPERATION

1. General (Fig. 1)

- A. This section gives a description of the drains and the vents that remove the waste fluids which collect in the APU.
- B. APU POST-SB 49-25;  
These APU's have one drain for the turbine plenum and the heat shield. The turbine plenum and the heat shield drain together into the most forward tube in the drain mast. The fuel flow divider drains into the adjacent tube.
- C. APU PRE-SB 49-25;  
These APU's have two different drains for the turbine plenum and the heat shield. The heat shield and the fuel flow divider drain together into the most forward tube in the drain mast. The turbine plenum drains into the adjacent tube.

2. APU Drains and Vents (Fig. 2)

- A. The waste fuel, oil, and water is removed from the APU by gravity-fed drains and vents.
  - (1) The rain water which collects around the intake door drains overboard through the intake duct drain. The intake duct drain goes out the right side of the APU compartment.
  - (2) The oil from the manual fill port drains into the APU compartment through the oil scupper drain.
  - (3) The water which collects in the intake plenum drains into the APU compartment through the intake plenum drain.
  - (4) APU WITH TWO DIFFERENT DRAINS FOR THE TURBINE PLENUM AND THE HEAT SHIELD;  
Four drains come out the drain mast on the APU access door. Fuel and oil drain from the fuel pump, the lube pump, and the IGV actuator. Unwanted fuel that collects when you try to start the APU drains through the turbine plenum drain. The drain for the bearing seal cavity drains oil from the APU engine seals. Fuel and water drain from the fuel flow divider and the heat shield drain.
  - (5) APU WITH ONE DRAIN FOR THE TURBINE PLENUM AND THE HEAT SHIELD;  
Four drains come out the drain mast on the APU access door. Fuel and oil drain from the fuel pump, the lube pump, and the IGV actuator. Water and unwanted fuel that collects when you try to start the APU drains through the turbine plenum and the heat shield drain. The drain for the bearing seal cavity drains oil from the APU engine seals. Fuel drains from the fuel flow divider drain.
  - (6) Tell-tale drains are installed on the drain lines for the lube pump/fuel control unit/IGV actuator and the bearing seal areas. Tell-tale drains are fluid traps that you can use to isolate the leakage from a drain line. You can also use the tell-tale drains to find the leakage rate of the drain lines.

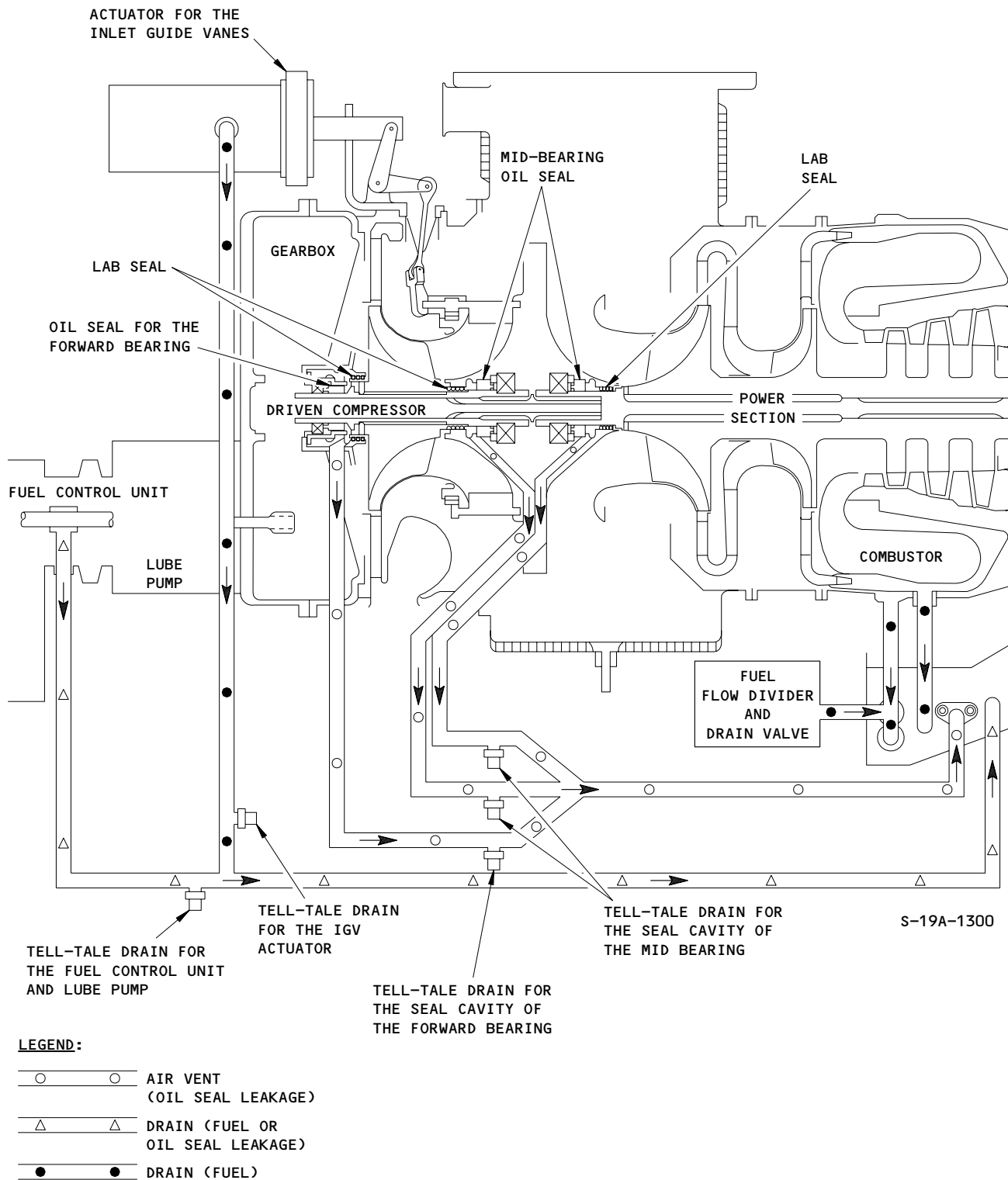
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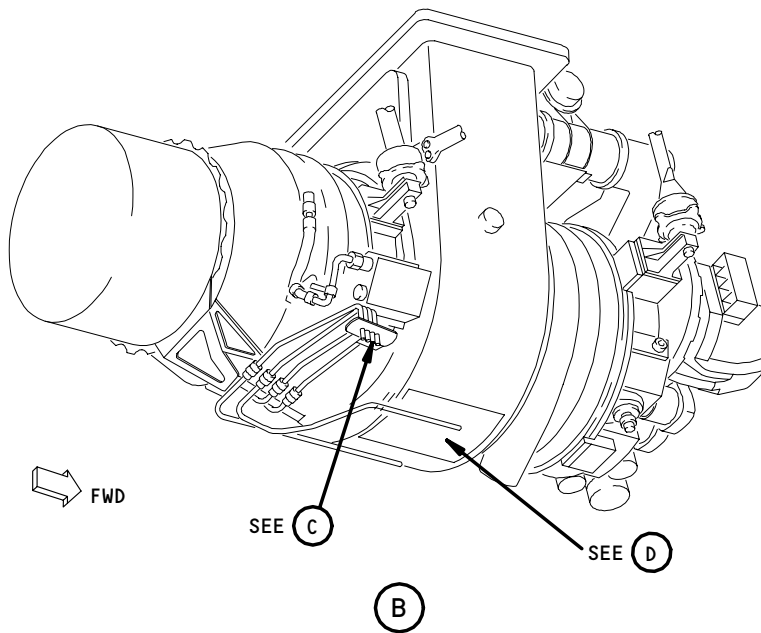
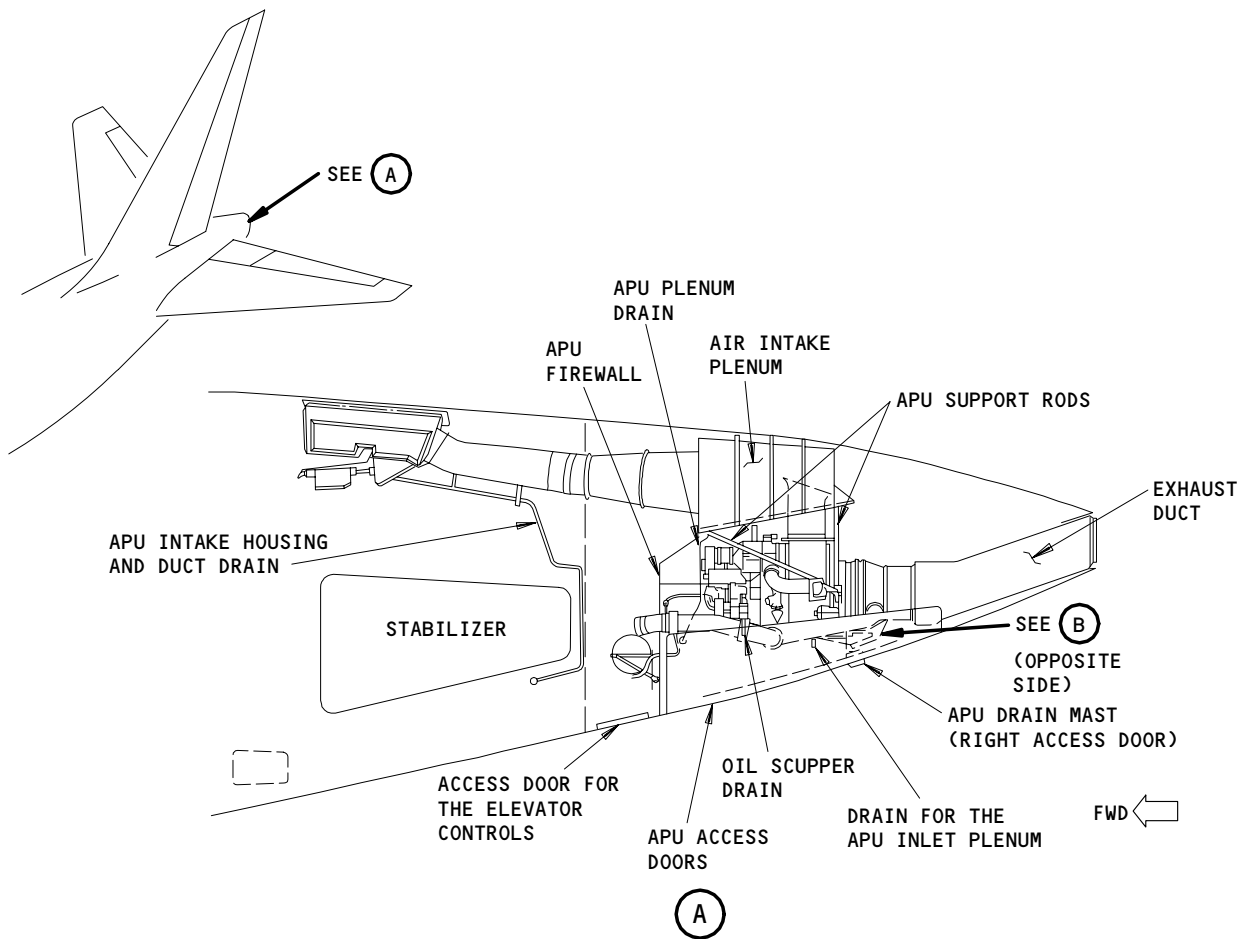
Page 1  
Dec 22/07



APU Drains and Vents System  
Figure 1

EFFECTIVITY	
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49-16-00



APU Drain Locations  
Figure 2 (Sheet 1)

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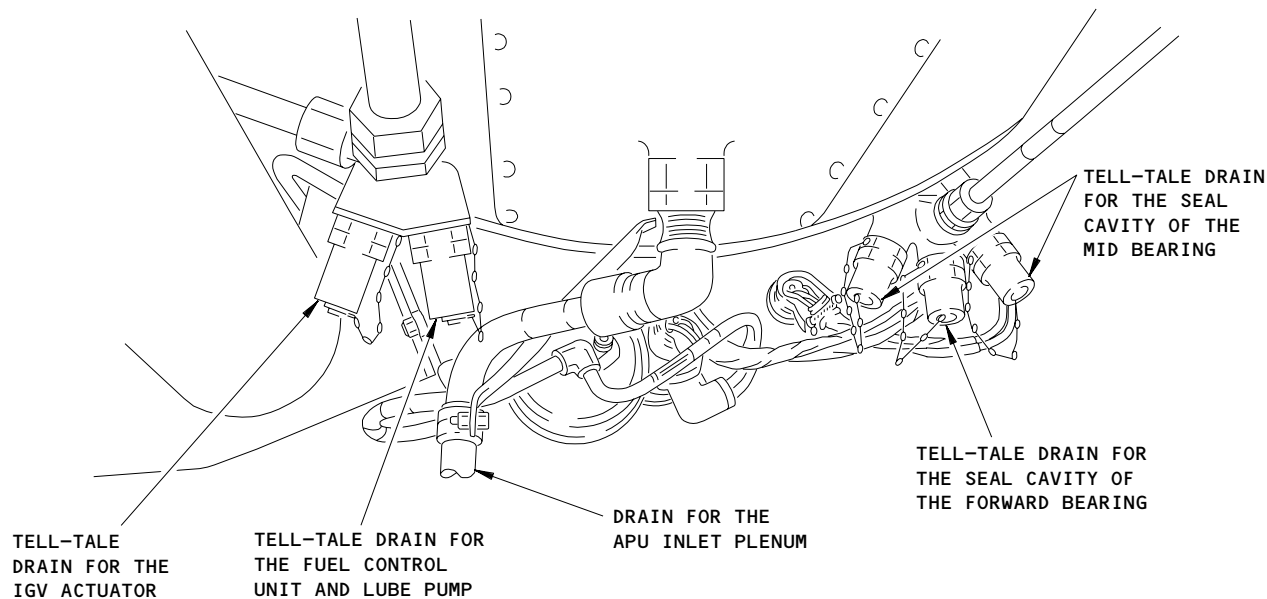
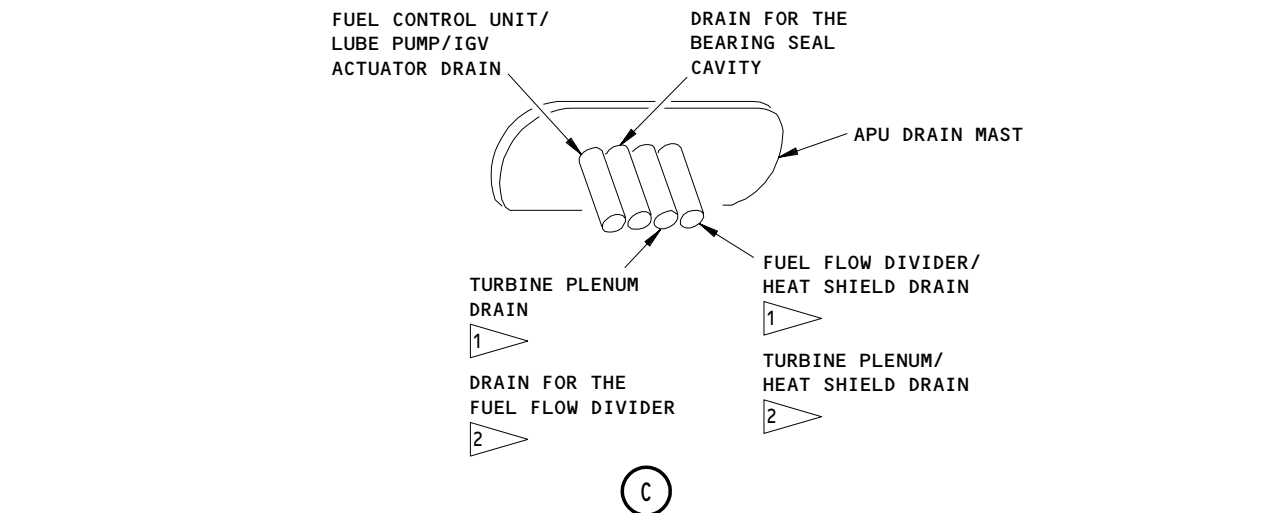
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Page 3  
May 10/92

# BOEING

## 767 MAINTENANCE MANUAL



(VIEW IN THE FORWARD DIRECTION)

- 1 ▷ APUs WITH TWO DIFFERENT DRAINS FOR THE TURBINE PLENUM AND THE HEAT SHIELD
- 2 ▷ APUs WITH ONE DRAIN FOR THE TURBINE PLENUM AND THE HEAT SHIELD





APU Drain Locations  
Figure 2 (Sheet 2)

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
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767  
FAULT ISOLATION/MAINT MANUAL

APU DRAINS AND VENTS

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
DRAIN - APU INLET PLENUM	2	1	315AL, 316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - APU PLENUM	1	1	315AL, 316AR, APU COMPT, LEFT FORWARD CORNER	49-16-03
DRAIN - BEARING SEAL CAVITY	2	1	315AL, 316AR, APU COMPT, DRAIN MAST	49-16-00
DRAIN - FORWARD BEARING SEAL CAVITY - TELL TALE	2	1	315AL, 316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - FUEL CONTROL UNIT/LUBE PUMP/IGV ACTUATOR	2	1	315AL, 316AR, APU COMPT, DRAIN MAST	49-16-00
DRAIN - FUEL CONTROL UNIT/LUBE PUMP - TELL TALE	2	1	315AL, 316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - FUEL FLOW DIVIDER 	2	1	315AL, 316AR, APU COMPT, DRAIN MAST	49-16-00
DRAIN - FUEL FLOW DIVIDER/HEAT SHIELD 	2	1	315AL, 316AR, APU COMPT, DRAIN MAST	49-16-00
DRAIN - IGV ACTUATOR - TELL TALE	2	1	315AL, 316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - MID-BEARING SEAL CAVITY - TELL TALE	2	2	315AL, 316AR, APU COMPT, BOTTOM OF INLET PLENUM	49-16-00
DRAIN - OIL SCUPPER	1	1	315AL, 316AR, APU COMPT, LOWER LEFT SIDE OF APU	49-27-00
DRAIN - TURBINE PLENUM 	2	1	315AL, 316AR, APU COMPT, DRAIN MAST	49-16-00
DRAIN - TURBINE PLENUM/HEAT SHIELD 	2	1	315AL, 316AR, APU COMPT, DRAIN MAST	49-16-00
MAST - APU DRAIN	2	1	315AL, 316AR, APU COMPT, DRAIN MAST	49-16-00

\* SEE THE WDM EQUIPMENT LIST

-  APUs WITH TWO DIFFERENT DRAINS FOR THE TURBINE PLENUM AND THE HEAT SHIELD
-  APUs WITH ONE DRAIN FOR THE TURBINE PLENUM AND THE HEAT SHIELD

APU Drains and Vents - Component Index  
Figure 101

EFFECTIVITY

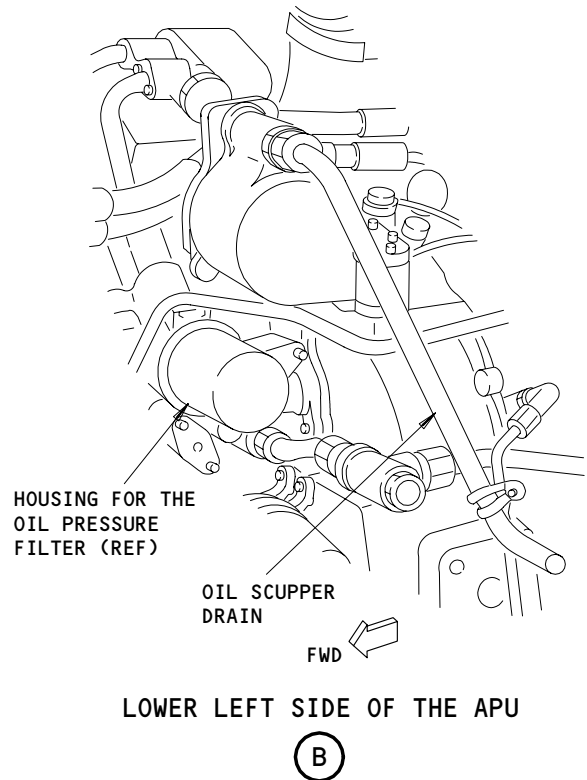
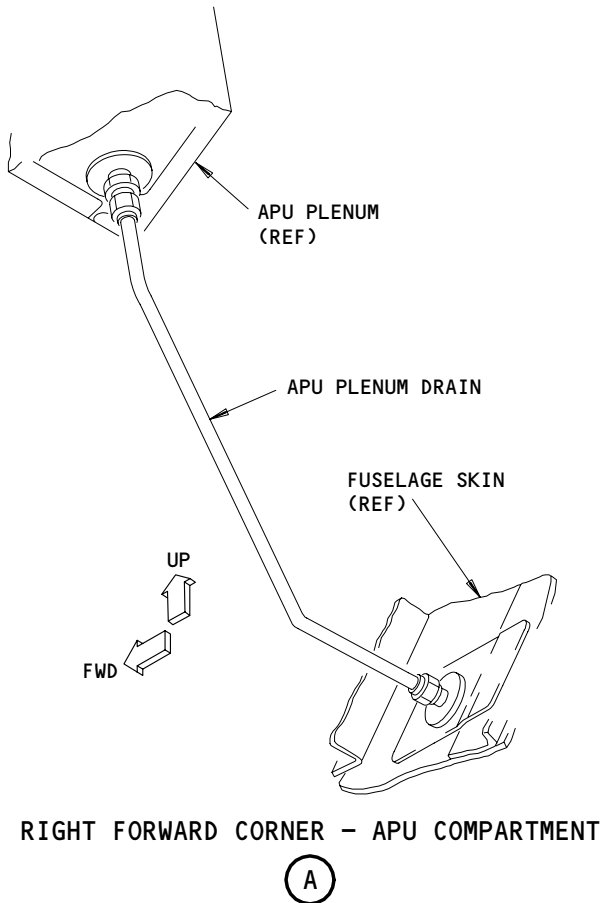
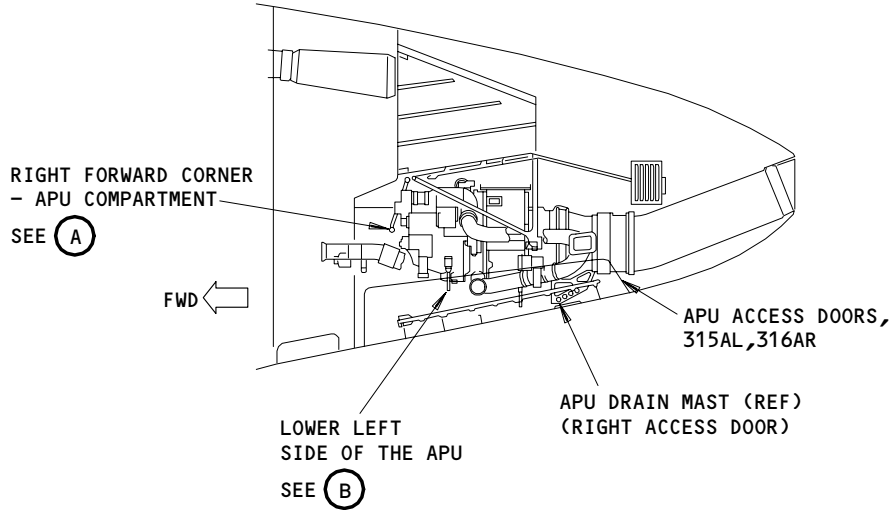
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Page 101  
Dec 22/07

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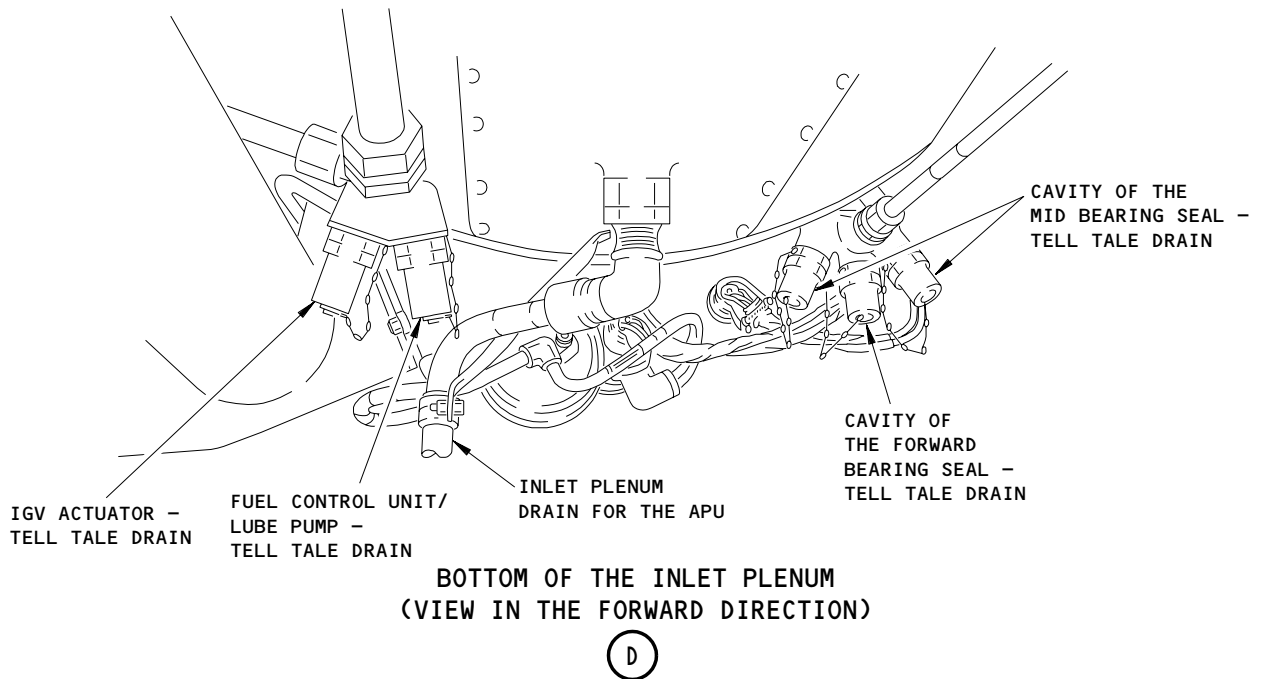
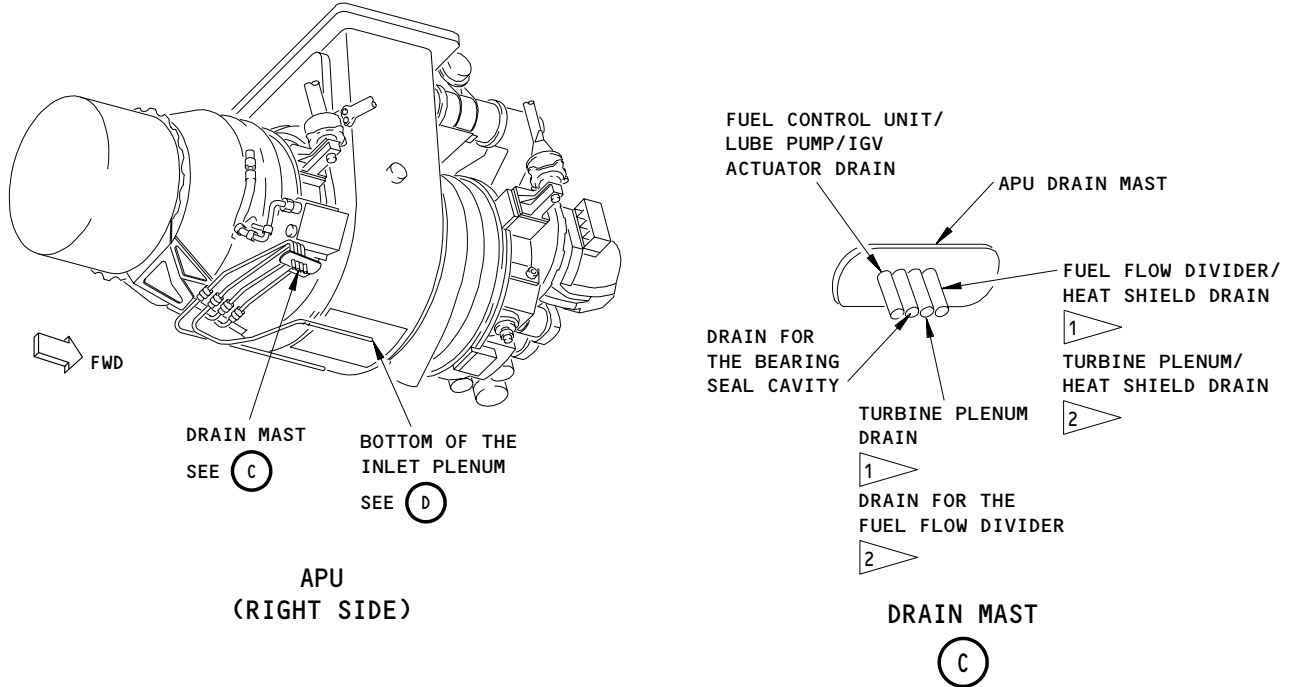


APU Drains and Vents - Component Location  
Figure 102 (Sheet 1)

EFFECTIVITY	ALL
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49-16-00





- 1 APU with two different drains for the turbine plenum and the heat shield
- 2 APU with one drain for the turbine plenum and the heat shield

APU Drains and Vents - Component Location  
 Figure 102 (Sheet 2)

EFFECTIVITY	ALL
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49-16-00

APU DRAINS AND VENTS – INSPECTION/CHECK

1. General

- A. This procedure contains these two tasks:
  - (1) APU Drain System Inspection
  - (2) APU Leakage Check.
- B. In the drain system inspection, you examine the drain lines and their parts for damage.
- C. In the APU leakage check, you operate the APU and examine the drain mast for drops of fuel and oil.
- D. The components that can cause drain leakage from the drain mast are as follows:
  - (1) The lube pump
  - (2) The fuel control unit
  - (3) The IGV actuator
  - (4) The bearing seal areas
  - (5) The turbine plenum case.
- E. Measure the leakage by how many drops of fluid drain out each minute during the usual APU operation. The leakage check task contains the leakage limits for each component drain outlet. The repair steps for too much leakage are also given for each component drain outlet.
- F. You can get access to the drain lines for the drain system through the APU access doors.

TASK 49-16-00-206-001

2. APU Drain System Inspection (Fig. 601)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 866-006

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

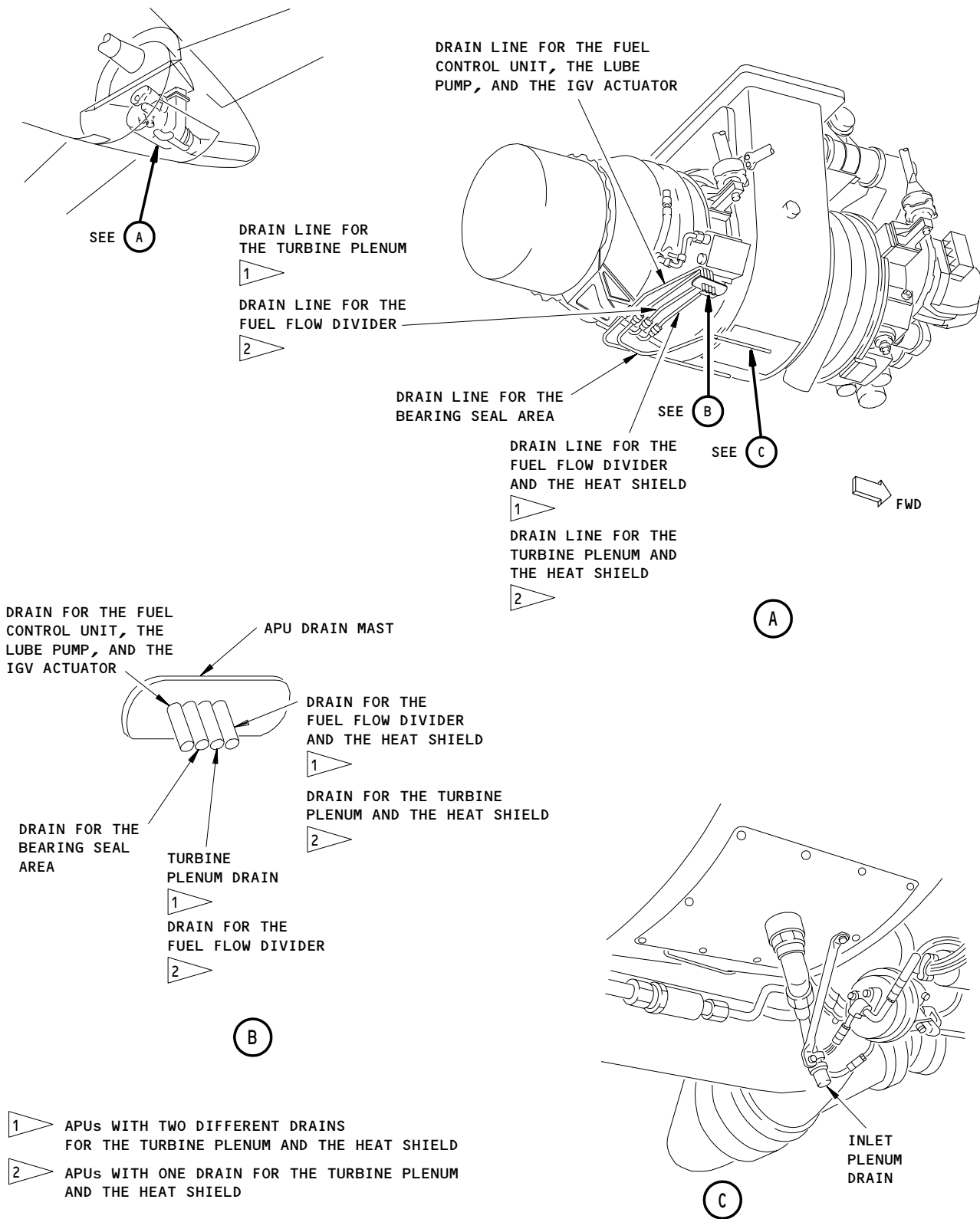
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ALL

49-16-00

01

Page 601  
Dec 22/07



APU Drain System Inspection  
Figure 601

EFFECTIVITY

ALL

49-16-00

03

Page 602  
Dec 22/07

S 866-007

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 016-008

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) While you hold the left access door in the closed position, open the four latches on the right access door.  
  

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.
  - (b) Open the left access door to the fully open position and manually lock the hold-open strut.  
  

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.
  - (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.  
  

NOTE: The location of the detent latch is at the forward end of the right access door.
  - (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-002

- (4) Examine the APU drain lines:
- (a) Examine the tubes for cracks, worn areas, and corrosion.
  - (b) Examine the tube connections for damaged threads and cracks.
  - (c) Examine the clamps and the brackets for distortion and cracks.
  - (d) If you find damage in the drain lines, repair the damage.

S 216-003

- (5) Examine the drain mast in the APU access door to make sure it correctly aligns with the drain lines.

EFFECTIVITY

ALL

49-16-00

03

Page 603  
Aug 22/01

S 416-004

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 866-009

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 866-010

- (8) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-16-00-206-011

3. APU Leakage Check (Fig. 602)

A. General

(1) This task measures the quantity of fluid that drains from the APU drains. The drain outlets examined in this task are as follows:

(a) The Fuel Flow Divider

(b) The Bearing Seal Areas

(c) The IGV Actuator

(d) The Turbine Plenum

(e) The Fuel Control Unit

(f) The Lube Pump.

B. Standard Tools and Equipment

(1) Container - 1 cup (250 cc) capacity, for fuel (two are necessary)

(2) Cylinder - With graduations, 250 cc capacity, 1 cc divisions, for fuel and oil

C. References

(1) AMM 49-11-00/201, Auxiliary Power Unit

(2) AMM 49-11-01/401, Auxiliary Power Unit

(3) AMM 49-27-01/401, Lube Pump

(4) AMM 49-31-01/401, Fuel Control Unit

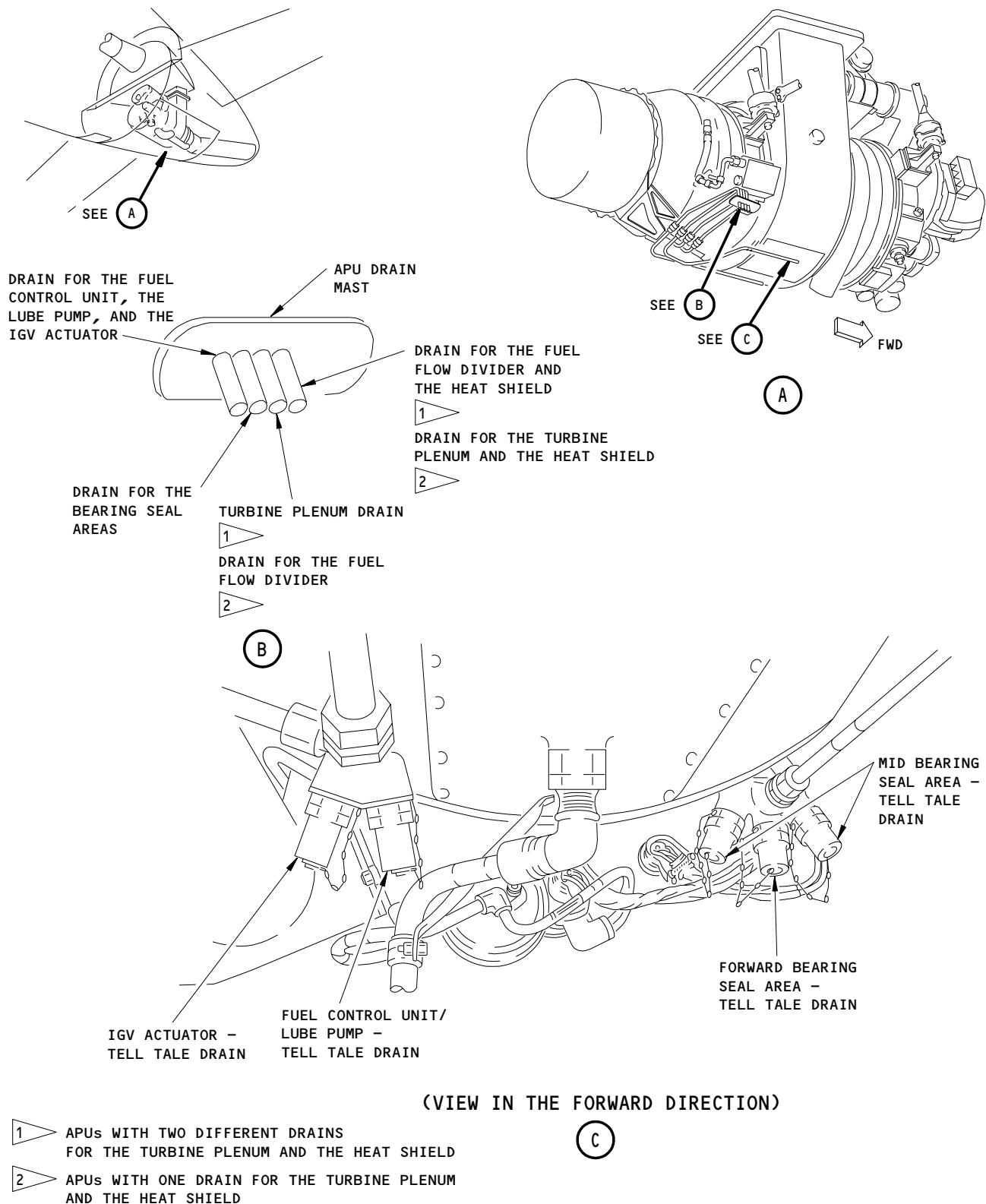
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ALL

49-16-00

08

Page 604  
Dec 22/07



APU Leakage Check  
Figure 602 (Sheet 1)

EFFECTIVITY	
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49-16-00

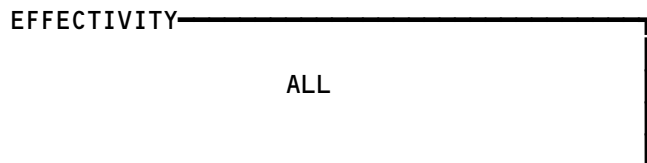
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767  
MAINTENANCE MANUAL

DRAIN/COMPONENT	LIQUID	PERMITTED LEAKAGE (DURING APU OPERATION)	PROCEDURE TO CORRECT THE LEAKAGE
FUEL FLOW DIVIDER/ HEAT SHIELD DRAIN 1 DRAIN FOR THE FUEL FLOW DIVIDER 2	FUEL	DURING APU OPERATION: 2.5 CC/HR (1 DROP/MINUTE) AFTER APU SHUTDOWN: 60CC	REPLACE THE FUEL FLOW DIVIDER (AMM 49-31-01/401).
BEARING SEAL AREAS	OIL	NO LIMIT	NO CORRECTIVE STEPS ARE NECESSARY, PROVIDED THE APU OIL CONSUMPTION RATE IS NOT MORE THAN THE LIMIT (AMM 49-11-00/201).
LUBE PUMP/FUEL CONTROL UNIT DRAIN	OIL FUEL	NONE 0.3 CC/HR (8 DROPS/HOUR)	REPLACE THE FUEL CONTROL UNIT (AMM 49-31-01/401).
IGV ACTUATOR DRAIN	FUEL	2.5 CC/HR (1 DROP/MINUTE)	REPLACE THE IGV ACTUATOR (AMM 49-52-02/401).
TURBINE PLENUM DRAIN 1 TURBINE PLENUM/HEAT SHIELD DRAIN 2	FUEL	DURING APU OPERATION: NONE THERE IS NO LIMIT DURING AN APU SHUTDOWN OR AFTER A NO START CONDITION OCCURS.	NO CORRECTIVE STEPS ARE NECESSARY.

TABLE 601

- 1 APU(S) WITH TWO DIFFERENT DRAINS FOR THE TURBINE PLENUM AND THE HEAT SHIELD  
2 APU(S) WITH ONE DRAIN FOR THE TURBINE PLENUM AND THE HEAT SHIELD

APU Leakage Check  
Figure 602 (Sheet 2)



49-16-00

- (5) AMM 49-31-03/401, Fuel Flow Divider and Solenoid Valve
- (6) AMM 49-52-02/401, Inlet Guide Vane Actuator

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 866-013

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-014

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 016-015

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

EFFECTIVITY

ALL

49-16-00

07

Page 607  
Aug 22/01



- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-016

- (4) Examine the tell-tale drains:
  - (a) One at a time, remove the drain traps from the five tell-tale drains and examine them for fluid.
  - (b) If you find fluid in a drain trap, do these steps:
    - 1) Make a note of which component drain trap had the fluid in it.
    - 2) Remove the fluid from the drain trap.
  - (c) Install the drain traps on the tell-tale drains.
  - (d) Install lockwires on all the drain traps that did not have fluid in them.

S 286-017

- (5) Do the leakage check for the APU drain system:
  - (a) Put containers below the drain mast outlets for the turbine plenum drain and the fuel flow divider/heat shield drain.
  - (b) Make sure the containers will not move during the APU operation.
  - (c) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
    - 1) P49 APU Auxiliary Panel
      - a) 49C2, APU PRIME CONT
      - b) 49C3, APU START
    - 2) P11 Overhead Panel
      - a) 11B35, APU ALTN CONT
  - (d) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
  - (e) Start and operate the APU (AMM 49-11-00/201).
  - (f) Operate the APU for a minimum of five minutes.

NOTE: You must operate the APU for a minimum of five minutes to let the fuel from the last APU shutdown drain from the fuel flow divider.

- (g) During the subsequent APU operation time, examine the containers below the drain mast outlets for drops of fluid.
- (h) Write down the length of time of the subsequent APU operation.
- (i) If you see drops of fluid, do these steps:
  - 1) Identify the drain line the fluid comes out of.

EFFECTIVITY

ALL

49-16-00

08

Page 608  
Dec 22/01

- 2) Write down the number of drops of fluid that drain out during the engine operation.

NOTE: During usual operation, you may feel high air flow from the drain mast (AMM 49-11-00/201).

- (j) Do a shutdown of the APU (AMM 49-11-00/201).

NOTE: When you do the APU shutdown, fuel can drain out the drain line for the fuel flow divider. This is a permitted shutdown condition.

- (k) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
- (l) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - 1) P11 Overhead Panel
    - a) 11B35, APU ALTN CONT
  - 2) P49 APU Auxiliary Panel
    - a) 49C2, APU PRIME CONT
    - b) 49C3, APU START
- (m) Remove the containers that are below the drain outlets.

S 976-018

- (6) For the fluid in the containers, use the subsequent engine operation time and the quantity of fluid to find the leakage rate.

S 216-019

- (7) If it is necessary, examine the drain traps on the tell-tale drains you made a note of:
  - (a) Do these steps for each tell-tale drain:
    - 1) Remove the drain trap from the tell-tale drain.
    - 2) If there is fluid in the drain trap, use the cylinder with graduations to measure the fluid quantity in the drain trap.
    - 3) Use the total engine operation time and the fluid quantity to find the leakage rate for the component.
    - 4) Install the drain trap on the tell-tale drain.
    - 5) Install a lockwire on the drain trap.

S 286-020

- (8) Make sure the leakage rates you measured are in the permitted limits shown in Table 601.

S 366-021

- (9) If a leakage rate is not in the permitted limits, do the repair steps for the leak (Ref Table 601).

EFFECTIVITY

ALL

49-16-00

07

Page 609  
Aug 22/01

S 416-022

(10) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 866-023

(11) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 866-024

(12) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-16-00

09

Page 610  
Aug 22/01

COMBUSTOR DRAIN PRESSURE RELIEF VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the Combustor Drain Pressure Relief Valve
  - (2) An installation of the Combustor Drain Pressure Relief Valve.
- B. The pressure relief valve for the combustor drain is on the aft bottom side of the APU.

TASK 49-16-01-004-001

2. Combustor Drain Pressure Relief Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Prepare for the removal

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

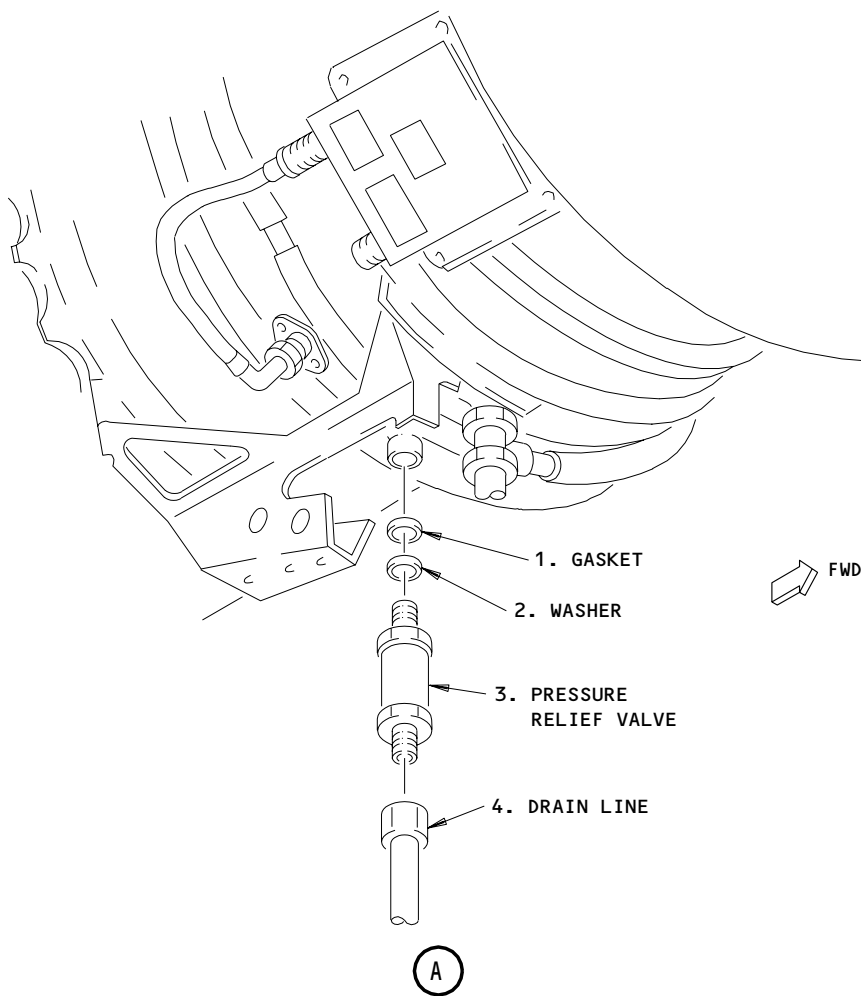
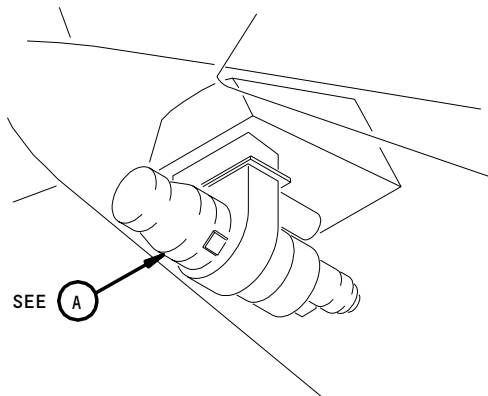
EFFECTIVITY

ALL

49-16-01

04

Page 401  
Aug 22/01



Combustor Drain Pressure Relief Valve Installation  
Figure 401

EFFECTIVITY	
ALL	

49-16-01

01

Page 402  
Dec 10/98

17894

2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

C. Combustor Drain Pressure Relief Valve Removal

S 024-005

- (1) Do these steps to remove the pressure relief valve for the combustor drain:

(a) Disconnect the drain line (4) from the pressure relief valve (3).

(b) Remove the pressure relief valve (3) from the combustor case.

(c) Remove the gasket (1) and the washer (2) from the pressure relief valve (3).

(d) Discard the gasket (1).

EFFECTIVITY

ALL

49-16-01

03

Page 403  
Aug 22/01

TASK 49-16-01-404-006

3. Combustor Drain Pressure Relief Valve Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1 3	Gasket Pressure Valve Assembly (Pressure Relief Valve)	49-16-01	02	55 50

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Combustor Drain Pressure Relief Valve Installation

S 424-007

- (1) Install the pressure relief valve (3) for the combustor drain:
- (a) Install the washer (2) and a new gasket (1) on the pressure relief valve (3).
  - (b) Install the pressure relief valve (3) in the combustor case.
    - 1) Tighten the pressure relief valve (3) to 110 inch-pounds (12.4 newton-meters).
  - (c) Connect the drain line (4) to the pressure relief valve (3).

S 414-008

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.
 

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
  - (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
  - (c) Lift the left access door until the two APU access doors are approximately aligned.

EFFECTIVITY

ALL

**49-16-01**

01

Page 404  
Aug 22/05

- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-015

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-016

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-16-01

04

Page 405  
Aug 22/01



COMBUSTOR DRAIN PRESSURE RELIEF VALVE – INSPECTION/CHECK

1. General

- A. This procedure contains the task to inspect the combustor drain pressure relief valve.
- B. The pressure relief valve for the combustor drain is on the aft bottom side of the APU. You can get access to the pressure relief valve through the APU access doors.

TASK 49-16-01-206-016

2. Combustor Drain Pressure Relief Valve Inspection

A. References

- (1) AMM 49-16-01/401, Combustor Drain Pressure Relief Valve

B. Access

(1) Location Zones

- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right

C. Procedure

S 026-018

- (1) Do this task: Pressure Relief Valve Removal (AMM 49-16-01/401).

S 216-013

- (2) Visually examine the pressure relief valve:
  - (a) Examine the pressure relief valve to make sure it does not have blockage.
  - (b) Examine the drain line to make sure it does not have blockage.
  - (c) If there is blockage, replace the pressure relief valve.

S 426-017

- (3) Do this task: Pressure Relief Valve Installation (AMM 49-16-01/401).

EFFECTIVITY

ALL

49-16-01

01

Page 601  
Aug 22/01

APU PLENUM DRAIN – INSPECTION/CHECK

1. General

- A. This procedure contains an inspection task for the drain outlet and the drain line for the APU plenum.
- B. The plenum drain outlet is on the forward right corner of the APU plenum. The drain line goes out through the fuselage to the right side.
- C. You can get access to the plenum drain outlet and the drain line through the APU access doors.

TASK 49-16-03-206-001

2. APU Plenum Drain Inspection (Fig. 601)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 866-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

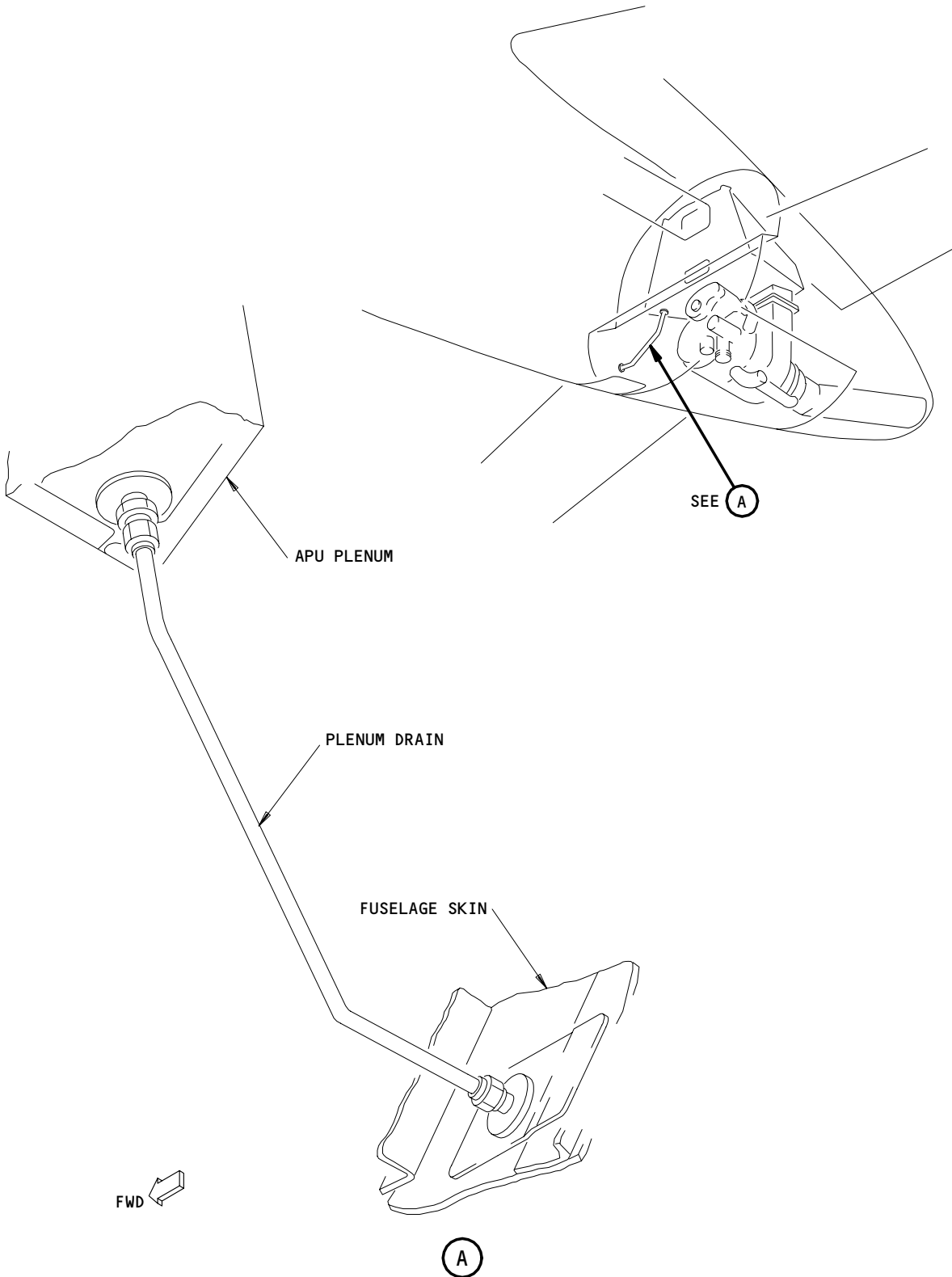
EFFECTIVITY

ALL

49-16-03

01

Page 601  
Apr 22/04



APU Plenum Drain Inspection  
Figure 601

EFFECTIVITY	
	ALL

49-16-03

17895

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 016-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-005

- (4) Visually examine the plenum drain components:

- (a) Disconnect the plenum drain line at the APU plenum and the fuselage.
- (b) Push a lockwire through the drain outlets on the plenum and the fuselage to make sure there is not blockage.
- (c) Make sure the plenum drain line does not have blockage.
- (d) Connect the drain line to the APU plenum and the fuselage.

S 416-006

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

EFFECTIVITY

ALL

49-16-03

03

Page 603  
Aug 22/01

 **BOEING**  
767  
MAINTENANCE MANUAL

- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 866-007

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 866-008

- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

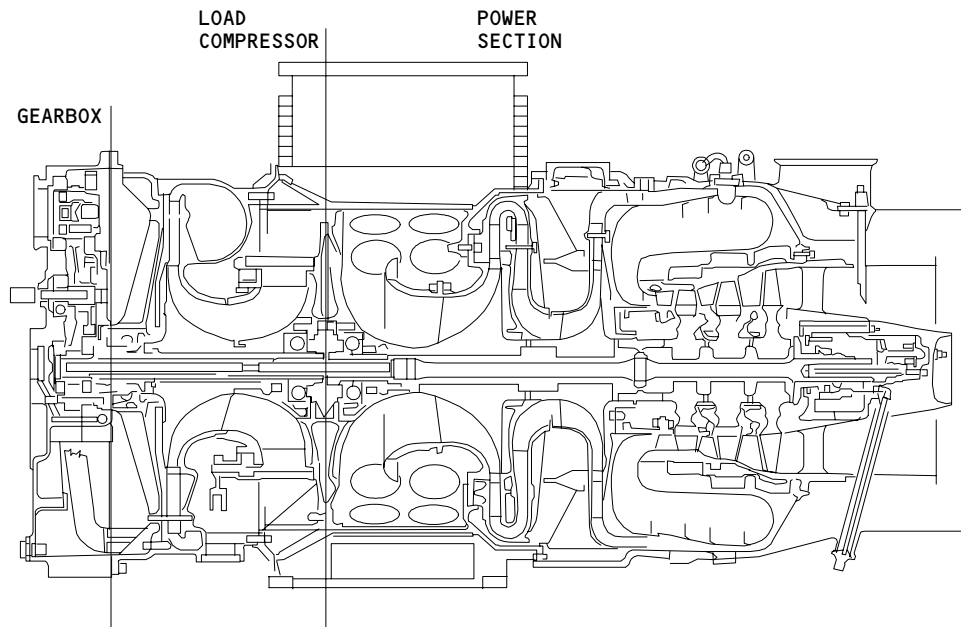
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Page 604  
Aug 22/01

APU ENGINE - DESCRIPTION AND OPERATION

1. General (Fig. 1)
  - A. The APU engine provides compressed air for the airplane pneumatic system, electrical power from a generator, and shaft power for driving the APU engine accessories. The engine consists of three independent, adjoining modules: the power section, the load compressor, and the engine gearbox.
2. Component Details
  - A. Power Section (Fig. 2)



APU Engine  
Figure 1

EFFECTIVITY

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49-21-00

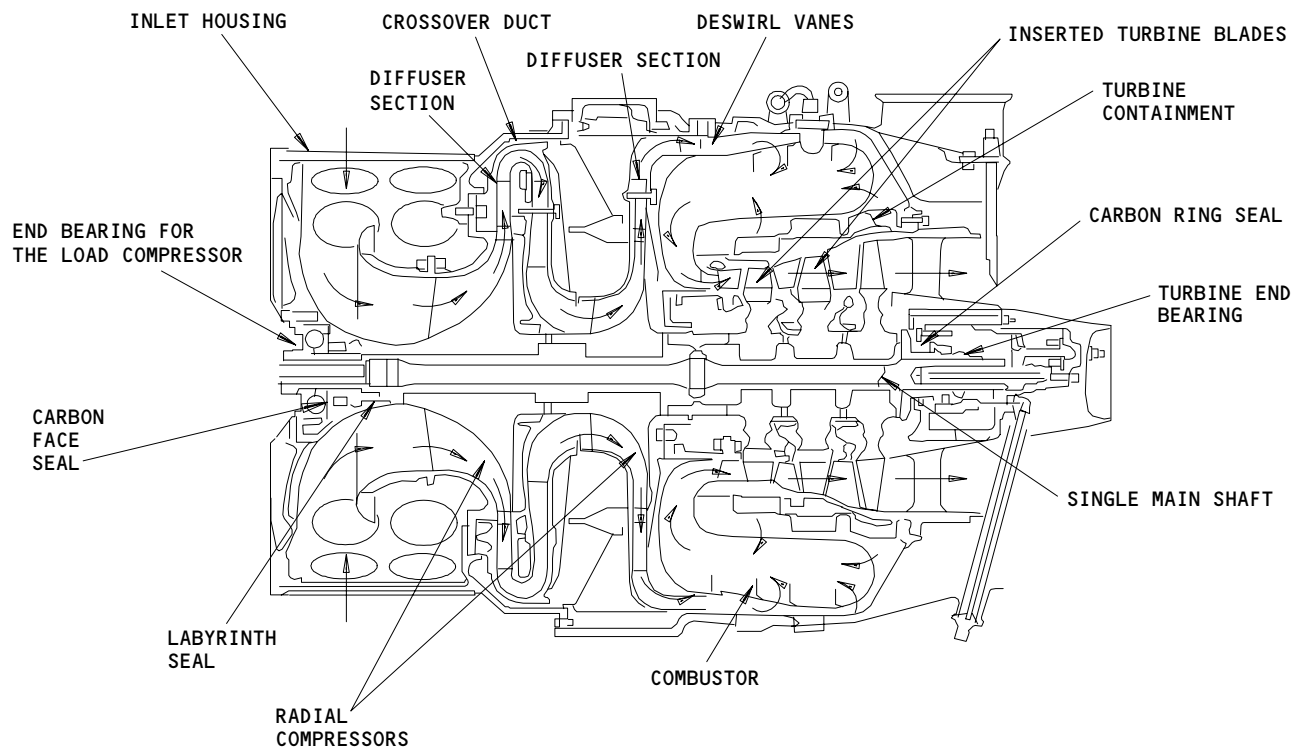
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Page 1  
Aug 10/92

(1) The power section converts compressed air and jet fuel into shaft horsepower. It consists of a two stage centrifugal compressor, an annular combustor, and a three stage axial turbine. All components are connected to a single shaft. This shaft drives the load compressor, electric generator, and engine accessories.

(a) Compressor

1) The compressor portion of the power section consists of an inlet housing, two centrifugal compressors, and two steel diffuser sections. The compressor rotors are titanium alloy forgings with integral rotor blades. Removal of the monopoles on the right and left sides of the compressor inlet plenum allow borescope inspection of the first stage compressor blades for damage. Through couplings, the compressor rotors are mounted on and driven by the power section shaft. The compressor housing provides the mounting base for the load compressor section.



APU Engine Power Section  
Figure 2

EFFECTIVITY	
	ALL

49-21-00

01

Page 2  
May 10/92

- (b) Combustor
  - 1) The combustion flame is contained within a reverse flow annular combustor. Air enters through axial, deswirl vanes into a turbine plenum cavity area around the combustor. Orifices in the combustor shell allow air to cool the chamber and regulate gas temperature. Near the aft end of the combustion chamber, holes are provided for the ignitor plug and 12 fuel atomizers.
- (c) Turbine
  - 1) The turbine portion of the power section contains three axial-flow turbine stages with no cooling air, turbine plenum housing, and an exhaust port. The first two stages contain cast alloy blades with fir tree attachment to the disk. The third stage rotor is a one piece forged configuration. The turbine rotors are mounted through couplings on the power section shaft. Full containment is provided for all rotor blades. The stator vanes are mounted between an inner and outer ring. The inner ring is riveted to a circular flange assembly around the inside of the stator ring. The exhaust port is an extension of the turbine plenum housing.
- (d) Bearings
  - 1) The power section shaft is supported by two antifriction type bearings. On the turbine end is a roller bearing with a carbon ring seal. The load compressor end has a ball bearing with a divided inner ring and a redundant double seal. The primary seal is a carbon face seal backed up by a secondary labyrinth seal. The annulus area between the two seals is vented overboard. The bearings are mounted in an annular oil film surrounding the bearing outer race. The oil is recirculated around the bearing to cool it and absorb some vibration.

B. Load Compressor (Fig. 3)

- (1) The load compressor provides compressed air for main engine starting, cabin air conditioning, air driven pumps and other pneumatic uses. The section consists of a set of inlet guide vanes, a centrifugal compressor, a diffuser, and an inlet housing. The load compressor is driven at engine shaft speed. The inlet guide vanes regulate airflow through the compressor.

(a) Load Compressor

- 1) The load compressor is a single stage centrifugal compressor of forged titanium alloy construction. The compressor rotor is mounted through couplings on its own shaft. An intermediate quill shaft connects the compressor shaft to the power section shaft and rotates it at power section speed. Removal of the monopoles on the right and left sides of the intake plenum allow inspection of the load compressor blades for damage. Inlet guide vanes at the compressor inlet control the amount of airflow through the compressor. The load compressor housing provides the mounting base for the accessory drive gearbox.

EFFECTIVITY

ALL

49-21-00

01

Page 3  
May 10/92



(b) Bearings

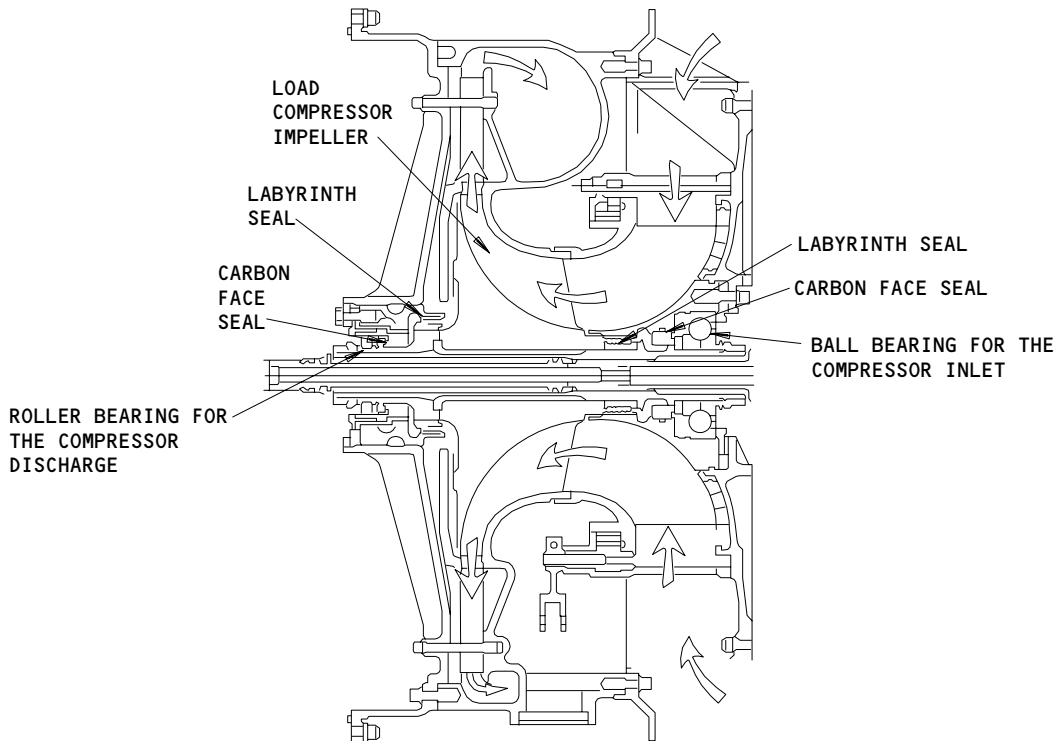
1) The load compressor shaft is supported by two bearings. The intake end has a ball bearing with a divided inner ring. The discharge end has a roller bearing. Both bearings have hydraulic mounting.

(c) Seals

1) The load compressor bearings use a redundant double seal arrangement. The primary seal is a carbon face seal with a positive contact with a secondary labyrinth seal. The annulus between the seals is vented overboard.

C. Gearbox (Fig. 4)

(1) The accessory drive reduces the turbine speed to drive components necessary for engine operation and to drive the electrical generator. A flexible quill shaft connects the gear train to the load compressor shaft. The gear train consists of eight spur gears that are straddle mounted. A sprag clutch under the starter gear engages the starter motor. The gears are oil jet lubricated. An integral 6.2-quart capacity oil reservoir is located at the bottom of the gearbox. A sight gage and a switch for the low oil level are used to monitor the oil level. An air-oil separator in the gearbox removes any entrapped oil from the air before the air is vented overboard. Accessories mounted on the gearbox include the lube pump and fuel control unit, oil cooling fan, starter motor, generator and oil filter.



APU Engine Load Compressor  
Figure 3

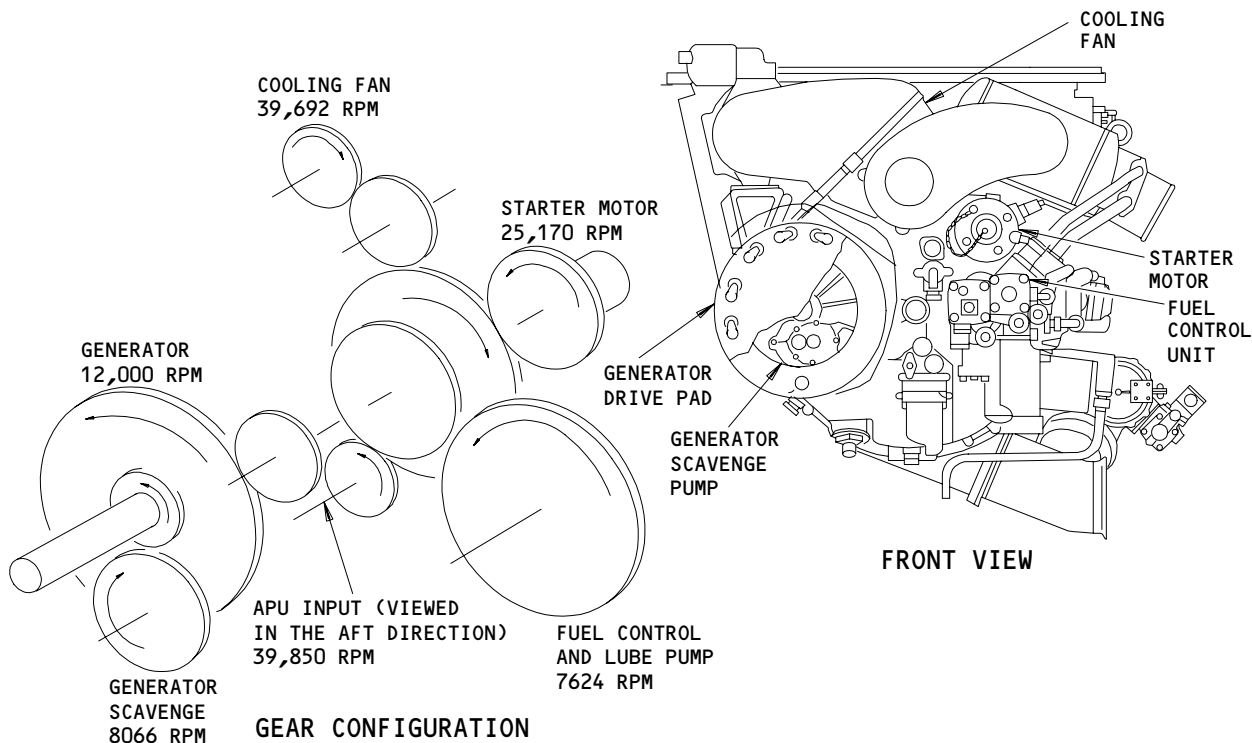
EFFECTIVITY	
	ALL

49-21-00

3. Operation

A. Functional Description

- (1) Static or ram air is drawn into the power section compressor and load compressor through the air intake plenum. Air flows through two stages of power section compression and discharged through axial, deswirl vanes into a turbine plenum area. Finely atomized fuel is added to the air entering the combustor and the air-fuel mixture is ignited by the igniter plug. Ignition is required only during the starting cycle. The heat of combustion sustains the burning as long as the fuel supply is not interrupted. Only air entering the combustor at the upstream end is used for combustion. Air entering downstream of the combustion zone cools the combustion chamber and regulates gas temperature. The combustion gases flow through three turbine stages into the exhaust port. Gas flow through the turbine section imparts a torque on the power section shaft. The turbine converts the pneumatic/thermal energy in compressed air to mechanical shaft power.
- (2) Bleed air for the airplane pneumatic system is obtained from the load compressor (Ref 49-52-00). If air is not being extracted or is reduced, the excess air is routed through the surge bleed valve and discharged into the exhaust port. During starting, the inlet guide vanes are closed to eliminate any pneumatic load on the APU. The surge bleed valve prevents the load compressor from surging (Ref 49-53-00).



EFFECTIVITY	ALL
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**49-21-00**

B. BITE

- (1) The APU control unit monitors APU operation and stores any faults in BITE (Ref 49-61-00-0). An APU BITE display on the EICAS maintenance mode indicates a fault being stored in BITE memory.

EFFECTIVITY

ALL

49-21-00

01

Page 6  
Aug 01/82

APU ENGINE - INSPECTION/CHECK

1. General

- A. This procedure contains two tasks. The first task does an external inspection of the APU. The second task does an internal inspection of the APU.
- B. The external inspection examines the tubes and hoses that supply fluids to the APU components. These tubes and hoses can be examined for damage with the APU installed in the airplane.
- C. The internal inspection does a check for internal worn areas and for damage. This inspection can also be done with the APU in the airplane. The load compressor and the first stage compressor are examined with a borescope. You can get access for the borescope through an access panel on the APU inlet plenum and through the igniter port or a fuel nozzle port.
- D. You can get access to the APU through the APU access doors.

TASK 49-21-00-206-001

2. APU External Inspection

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 866-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-033

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-21-00

01

Page 601  
Aug 22/01

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 016-003

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-004

- (4) Examine the APU:

- (a) Examine the tube assemblies for cracks, worn areas, and corrosion.
- (b) Examine the hose assemblies for kinks, worn areas, cuts, and deterioration.
- (c) Examine the connections on the tubes and hoses for the fuel, the oil, and the pneumatic systems for damaged threads and cracks.
- (d) Examine all the clamps and the brackets for distortion and for cracks.
- (e) Examine the gearbox and the gearbox mount for cracks and leakage.
- (f) Examine the heat shield on the combustor section for tears, looseness, and burned areas.
- (g) Examine the exhaust case for cracks and other damage.

EFFECTIVITY

ALL

49-21-00

03

Page 602  
Aug 22/01

S 866-034

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 866-035

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 796-010

- (7) Do a leakage check of the APU:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the APU for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 416-013

- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

TASK 49-21-00-206-014

3. APU Internal Inspection (Fig. 601)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

B. Standard Tools and Equipment

- (1) Flexible Fiber Optic Borescope and a light source as follows:
  - (a) Borescope External Diameter - 6mm maximum
  - (b) Borescope Length - 27 inches minimum
  - (c) Direct View Borescope

C. Consumable Materials

- (1) D00010 Compound, Anti-Seize - Fel-Pro C-5A

EFFECTIVITY

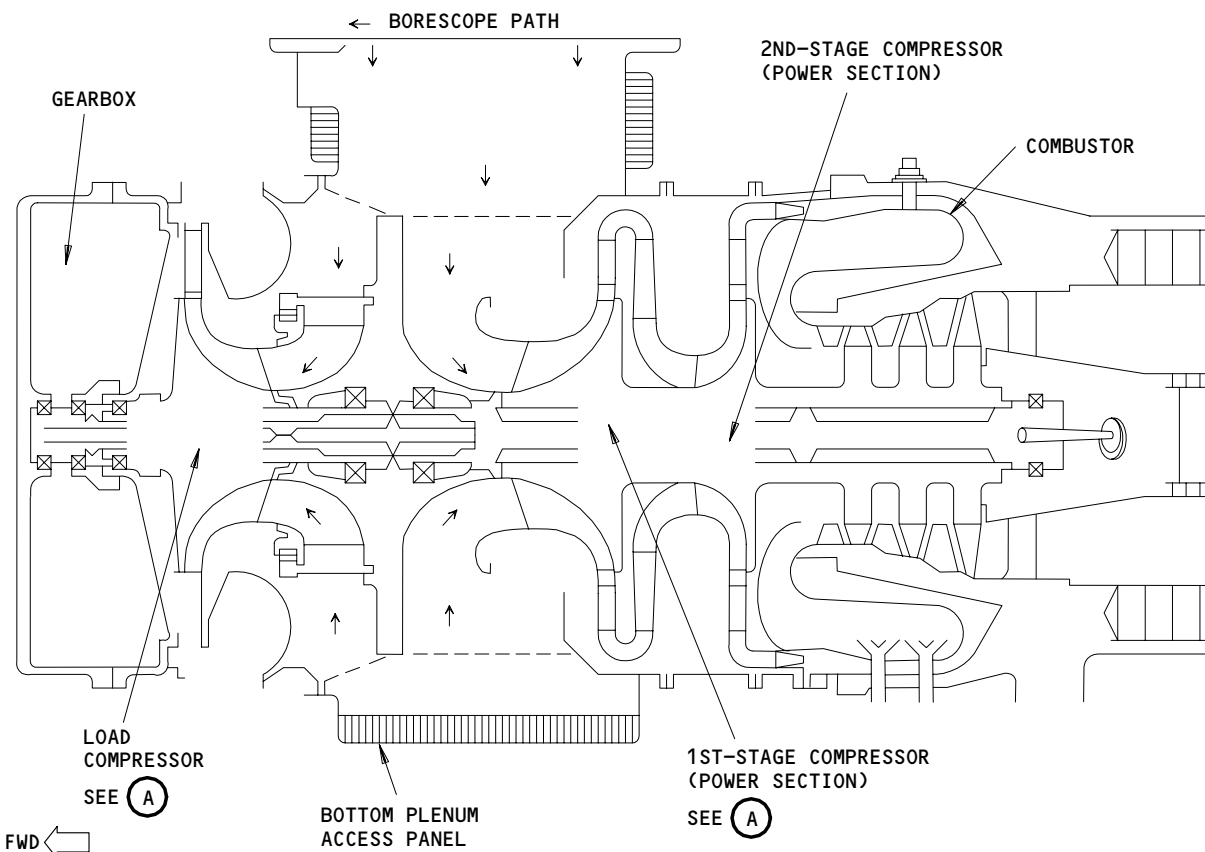
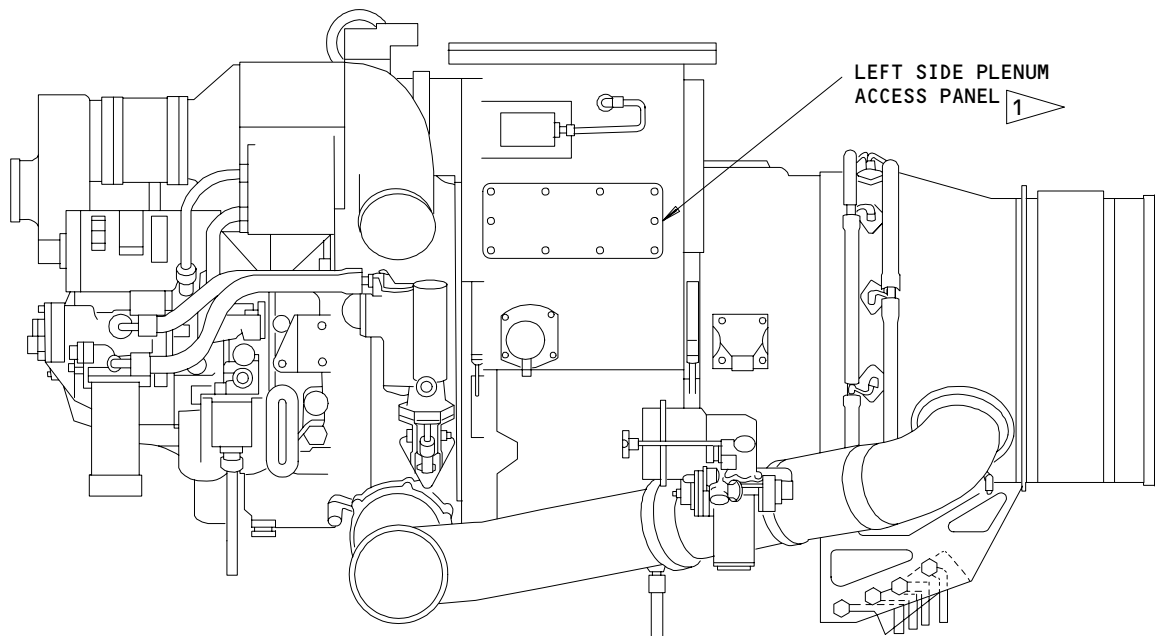
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49-21-00

03

Page 603  
Aug 22/01

**BOEING**  
767  
MAINTENANCE MANUAL

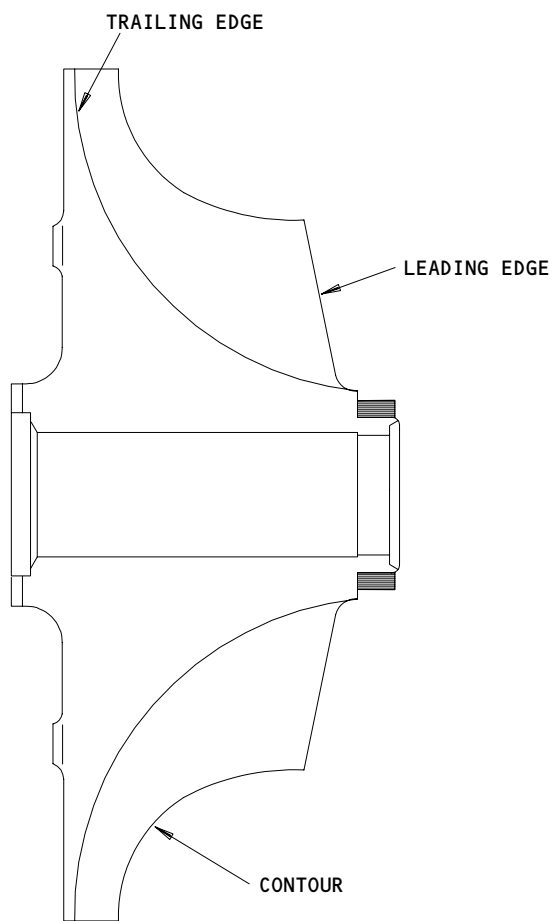


1 NOT INSTALLED ON ALL APU'S

APU Engine Inspection  
Figure 601 (Sheet 1)

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49-21-00



COMPRESSOR CROSS SECTION

(A)

A3822080CK1

APU Engine Inspection  
Figure 601 (Sheet 2)

EFFECTIVITY

ALL
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49-21-00

01

Page 605  
Aug 10/91

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D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 866-015

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-036

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:

- (a) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT
- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 016-016

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

EFFECTIVITY

ALL

49-21-00

03

Page 606  
Aug 22/01

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-017

- (4) Examine the APU inlet plenum for unwanted materials:
  - (a) APU WITH AN ACCESS PANEL ON THE LEFT SIDE OF THE APU INLET PLENUM;  
Remove the access panels on the bottom and the left side of the APU inlet plenum.
  - (b) APU WITHOUT AN ACCESS PANEL ON THE LEFT SIDE OF THE APU INLET PLENUM;  
Remove the access panel on the bottom of the APU inlet plenum.
  - (c) Examine screens for the compressor inlet and the oil cooling fan.
  - (d) Remove all of the unwanted material that you can see.

S 016-018

- (5) Open the inlet guide vanes (IGVs):
  - (a) Disconnect the two pressure hoses from the IGV actuator.
  - (b) Let the fuel drain from the hoses.
  - (c) Remove the IGV linkage cover from the APU.
  - (d) Move the inlet guide vanes to the open position.

S 296-037

- (6) Do the APU borescope inspection:
  - (a) Put the borescope through the access panel on the bottom of the inlet plenum.
  - (b) Use the borescope to examine the load compressor and the first stage compressor in the power section.

NOTE: You can use a flexible borescope to do the inspection. If a flexible borescope is not available, you can manually turn the engine as it is necessary to see all the compressor blades.

- 1) Leading edge erosion or corrosion with a depth more than 1/8-inch is not permitted.
  - 2) Trailing edge erosion or corrosion with a depth more than 1/2-inch is not permitted.
  - 3) Erosion or corrosion in the middle of the blades is not permitted.
  - 4) Leading edge cracks are not permitted.
  - 5) Trailing edge cracks are not permitted.
  - 6) Bent blades are not permitted.
  - 7) Heat distress is not permitted.
  - 8) Nicks that are the result of foreign object damage (FOD) are permitted as long as these conditions are met:
    - a) No significant vibration is evident.
    - b) Aircraft airflow needs are being met.
  - 9) All other foreign object damage (FOD) is not permitted.
- (c) Remove the borescope.

EFFECTIVITY

ALL

49-21-00

02

Page 607  
Aug 22/01

- S 416-024
- (7) Install the access panel(s) on the APU inlet plenum.
- S 866-026
- (8) Put the IGV actuator back in its usual condition:
- (a) Install the IGV linkage cover on the APU.
  - (b) Connect the two pressure hoses to the IGV actuator.
- S 866-028
- (9) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
- S 866-038
- (10) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
- S 796-029
- (11) Do a leakage check of the APU:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the APU for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- S 416-032
- (12) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.
- NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
  - (c) Lift the left access door until the two APU access doors are approximately aligned.
  - (d) Close the two APU access doors.
  - (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-21-00

05

Page 608  
Apr 22/04

APU AND GENERATOR LUBRICATION SYSTEM – DESCRIPTION AND OPERATION

1. General

A. The APU and generator lubrication system lubricates, cools, and scavenges the electrical generator and all bearings and gears in the engine. The system consists of the lube pump, generator scavenge pump, scavenge pump for the rear bearing, drain plug, magnetic chip detectors, oil cooler, oil filters, and several valves. The lubrication system is monitored by the oil temperature sensor, a switch for the low oil pressure, an oil quantity transmitter, and a switch for the low oil temperature.

2. Component Details

A. APU Lubrication (Fig. 1)

- (1) The APU lubrication system includes an oil reservoir, a lube pump assembly, a de-oil solenoid valve, a switch for the low oil temperature, a gearbox pressurization system, an oil cooler, and a scavenge system for the turbine bearing.
- (2) Oil Reservoir (Fig. 2)
  - (a) The oil reservoir stores the oil supply for the system. It is located at the bottom of the gearbox and has a capacity of 6.2 quarts. A manual fill port, with a scupper drain, and pressure fill provisions are included. The oil reservoir level is read through a sight glass with markings indicating SAFE and ADD. An oil quantity transmitter, located on the bottom of the gearbox, sends a signal to the Engine Indication and Crew Alerting System (EICAS) status and maintenance modes to display oil quantity and to display APU OIL QTY, when there are 4.25 quarts of oil in the APU gearbox (oil reservoir). The reservoir drain plug is located on the bottom of the gearbox. The plug contains a magnetic chip detector which can be inspected for possible gearbox damage without draining the reservoir. A magnetic chip detector for generator scavenge oil and a switch for the low oil temperature are located on the right side of the gearbox.
- (3) Lube Pump (Fig. 3)

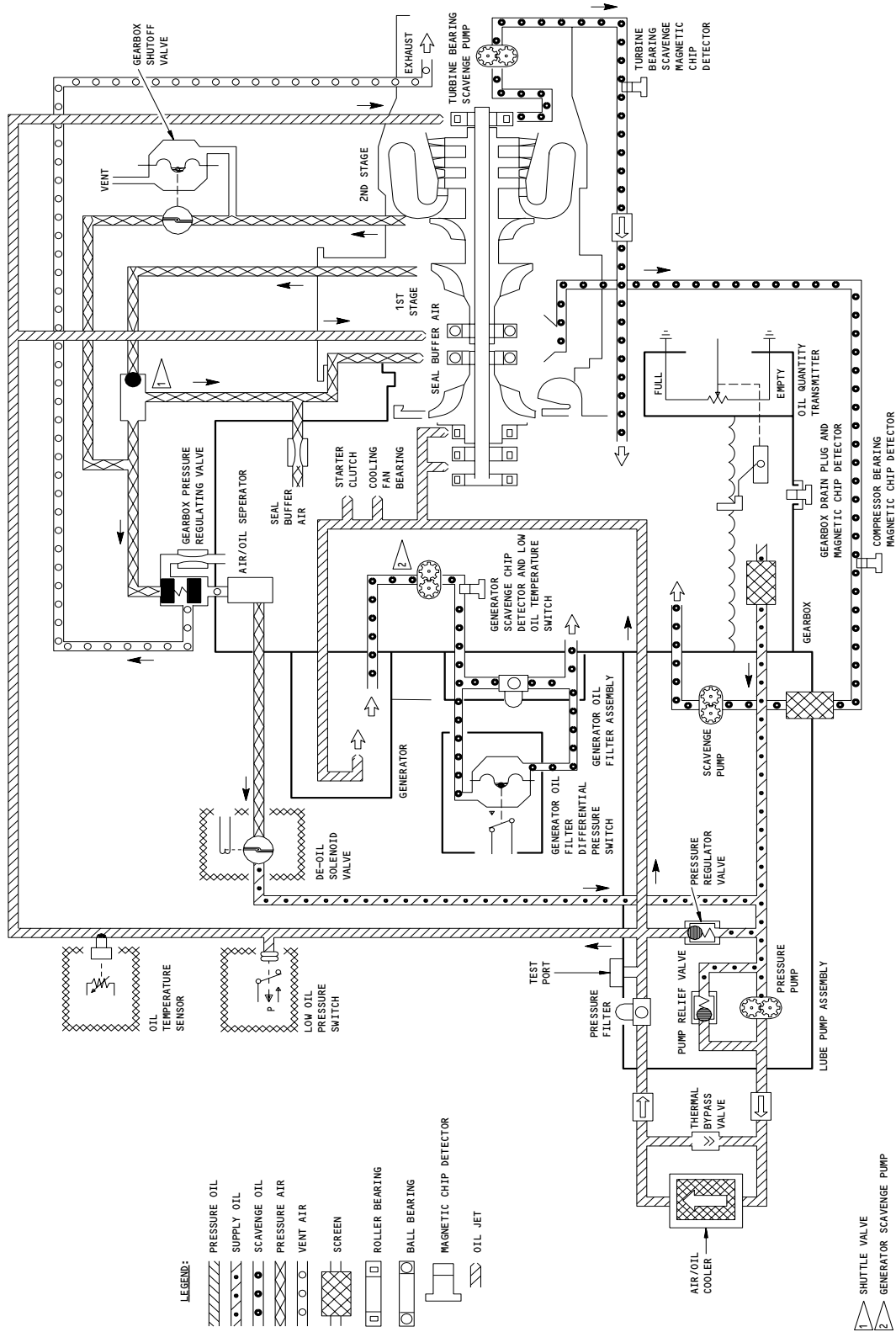
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Page 1  
Aug 22/09



APU and Generator Lubrication System  
Figure 1

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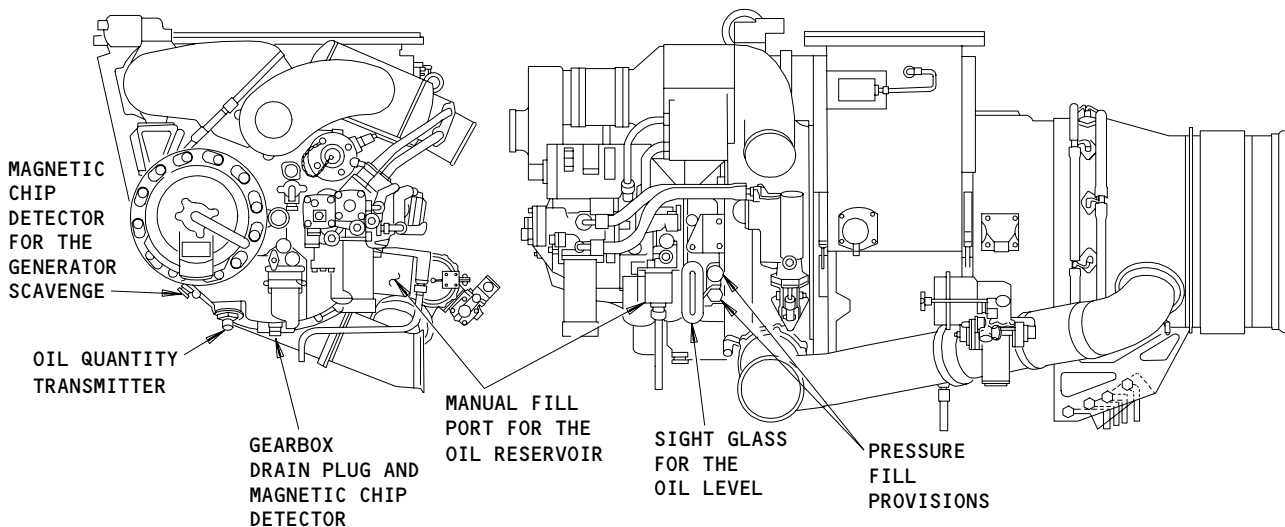
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- (a) The lube pump supplies oil under pressure to the main rotor bearings, to the bearings and gears in the gearbox, and to the generator. It also scavenges oil from the compressor bearings. The lube pump assembly contains a pressure pump, a scavenge pump, a filter element, a relief valve for the oil pressure, a regulating valve for the oil pressure, a differential pressure indicator and installation areas for the fuel control. The pump is pilot mounted and bolted to the gearbox on the left side. The pressure and scavenge gear pumps are driven by a common pump shaft from the accessory drive gearbox. The pressure pump has a pressure relief valve to prevent overpressurization beyond  $200 \pm 5$  psi. The lube pump filter filters the oil flowing to the APU and generator lubrication system. It is a disposable filter with pleated fiberglass in a screw-on housing. An indicator for the filter differential pressure pops out at  $20 \pm 5$  psid to indicate when a filter change is due. The pressure regulator valve regulates the oil pressure to  $65 \pm 5$  psig. The lube pump housing provides a mounting base for the fuel control unit.
- (4) De-Oil Solenoid Valve (Fig. 4)



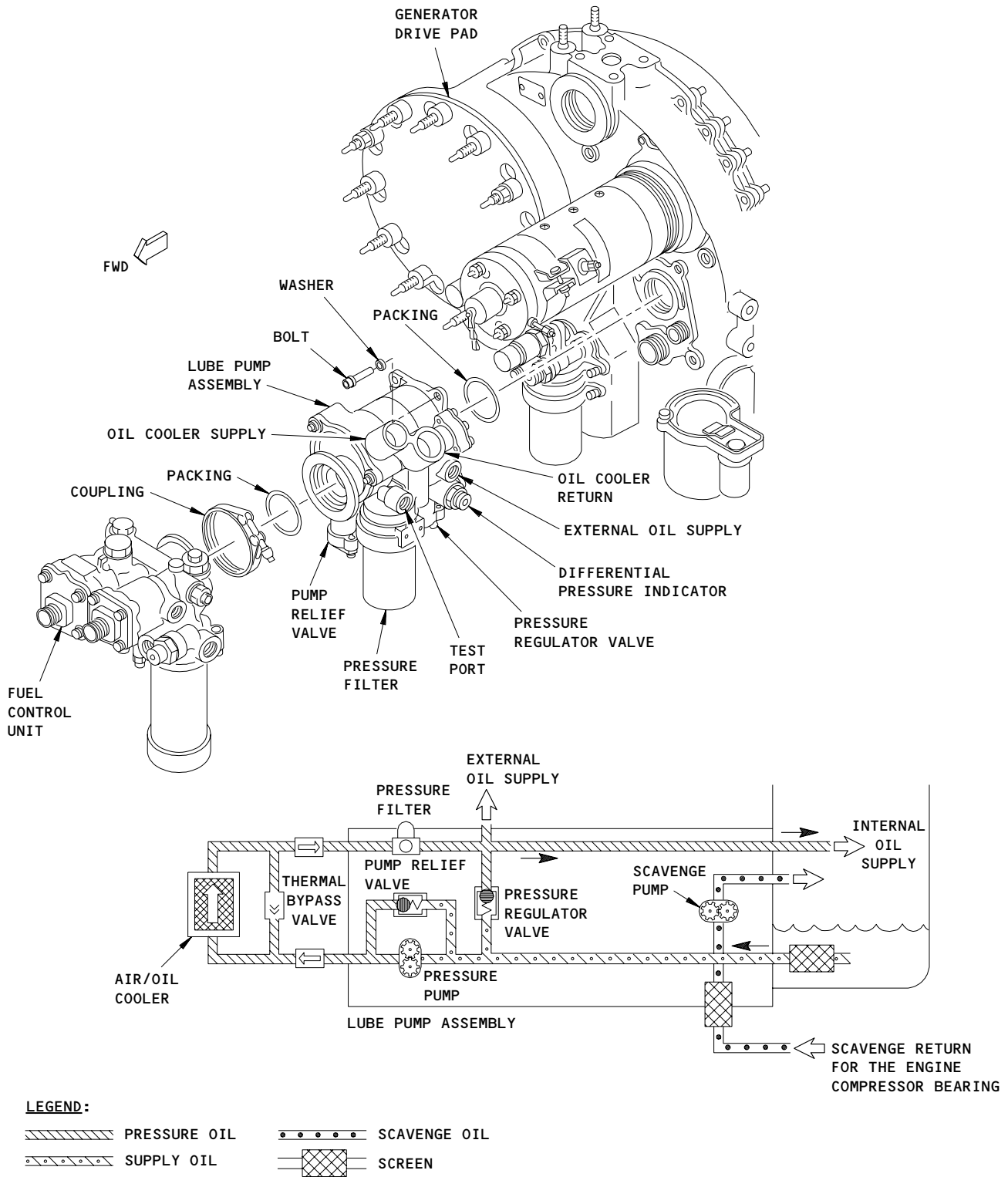
APU Oil Reservoir  
Figure 2

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49-27-00

# BOEING

## 767 MAINTENANCE MANUAL



APU Lube Pump Assembly  
Figure 3

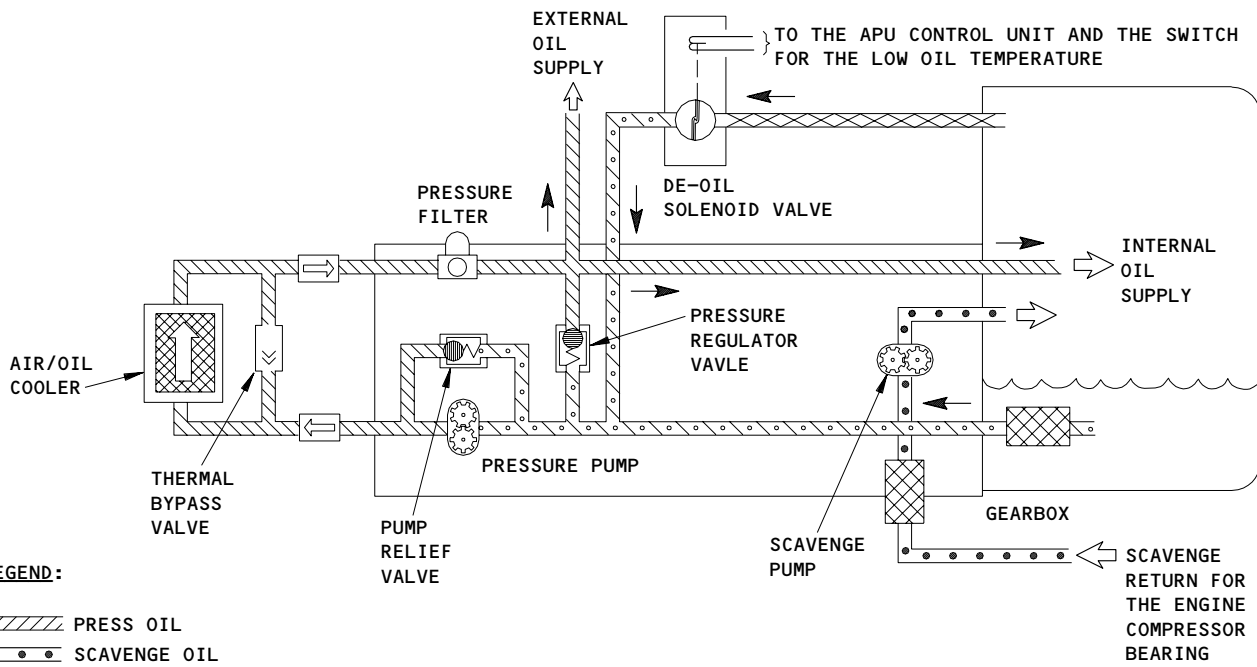
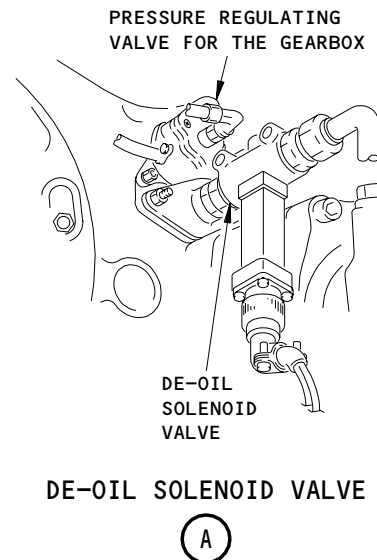
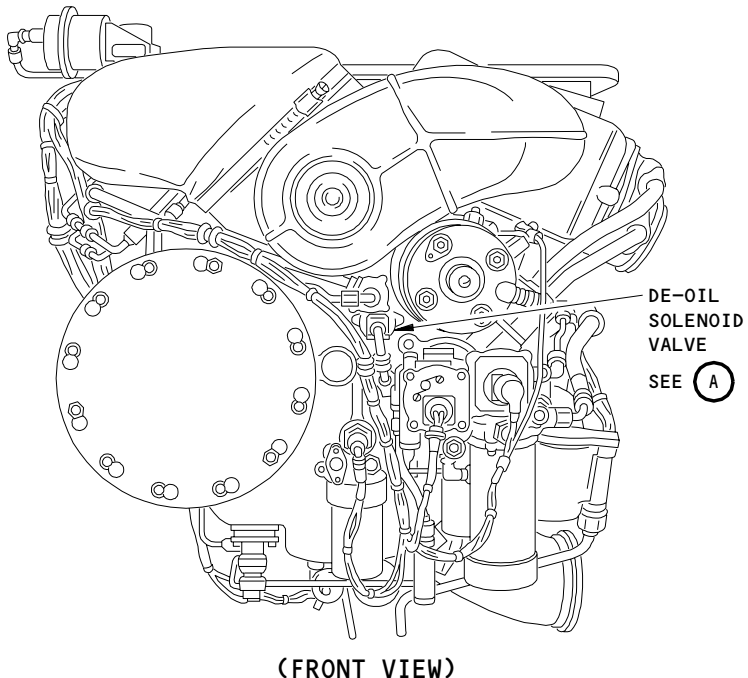
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49-27-00

01

Page 4  
Dec 22/07



LUBE PUMP ASSEMBLY

De-oiling  
Figure 4

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49-27-00

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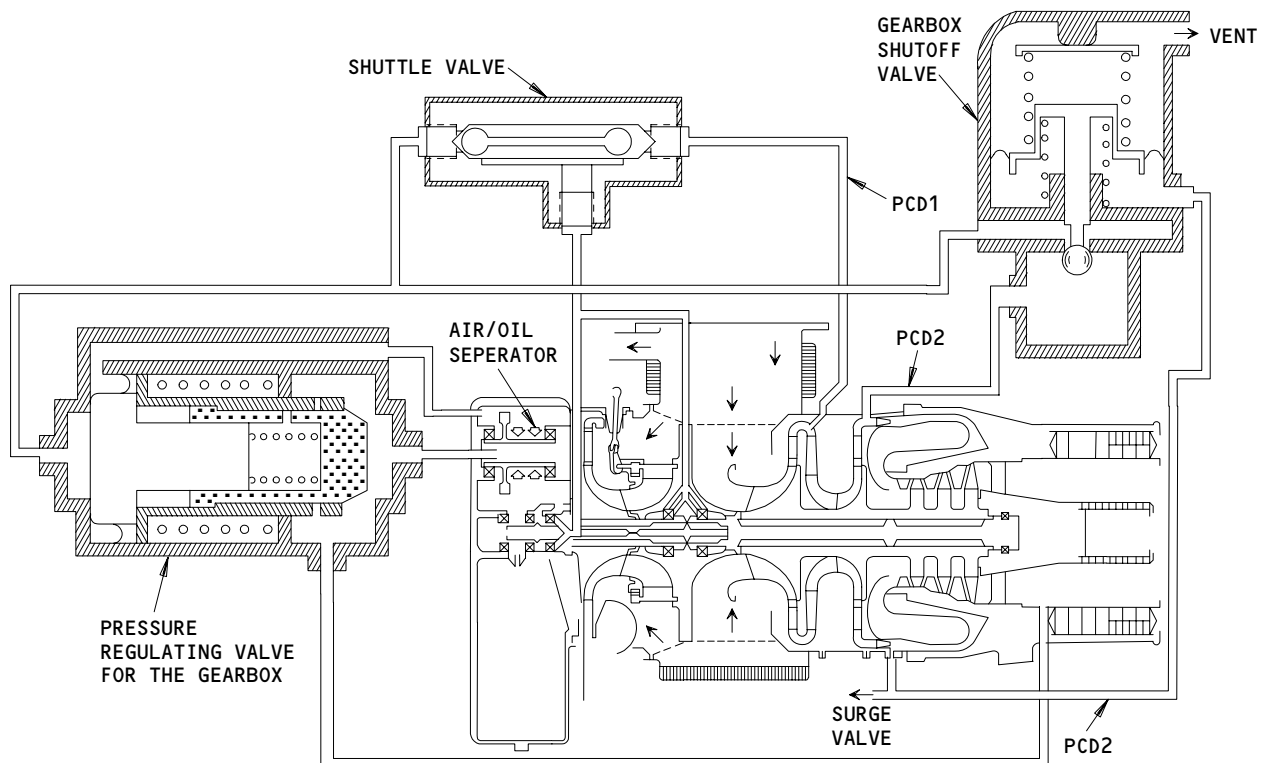
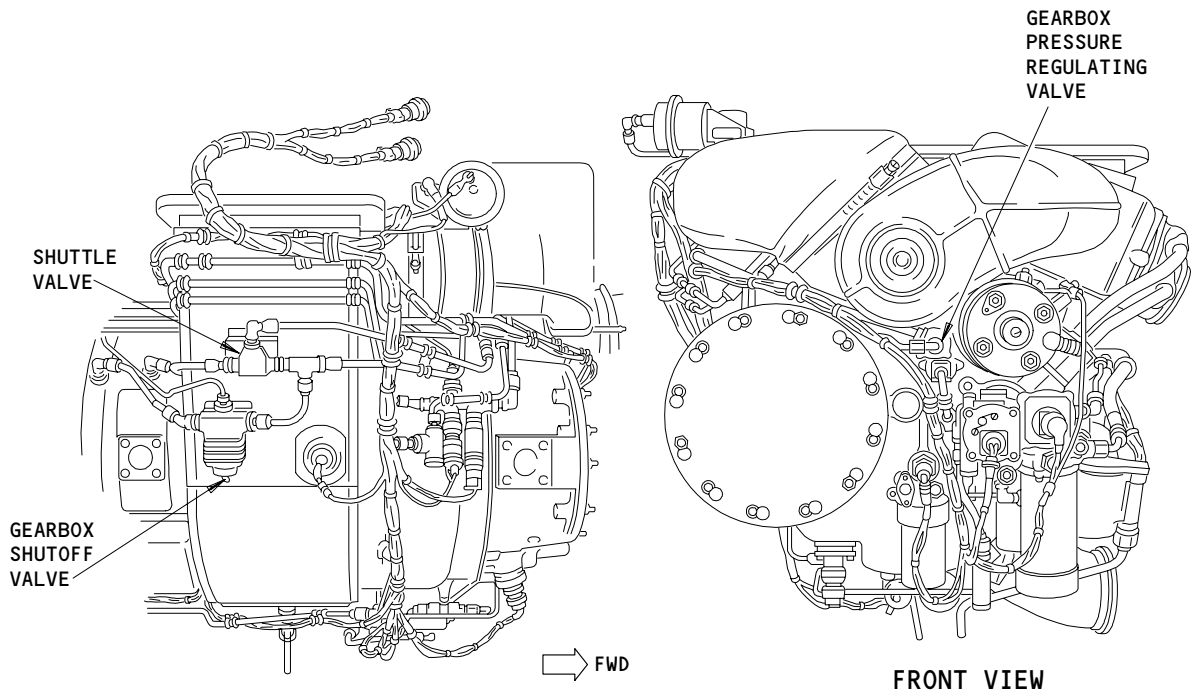


- (a) The de-oil solenoid is an electrically-actuated pneumatic valve bolted to the gearbox case. The valve de-oils the lube pump to reduce loading during cold starts.
  - (b) The switch for the low oil temperature activates the solenoid, through the starter motor, when a low temperature is approximately 25°F (-4°C). The solenoid is also activated by the APU control unit during an APU shutdown or when you try to start the APU and the oil temperature at the oil temperature sensor is less than 0°F (-18°C). The solenoid is deactivated when the starter motor operation stops or when the APU speed is 50%.
- (5) Switch for the Low Oil Temperature
- (a) The switch for the low oil temperature is installed on the bottom of the gearbox. The switch closes, to de-oil the system, when oil in the reservoir is below 25 ±7°F, and opens at 40°F. The low oil temperature switch is not monitored by the ECU BITE for condition or operation.
- (6) Gearbox Pressurization System (Fig. 5)
- (a) The gearbox pressurization system regulates the air flow which is a buffer for the seal and pressurizes the gearbox at varying altitudes to maintain lube pump performance. The air flow keeps oil from leaking past the primary seal into the load compressor. The shuttle check valve works with the gearbox shutoff valve to control the air supply. The seal buffering air comes from first stage compression below 15,000 feet and second stage compression above 15,000 feet. Second stage compression supplies gearbox pressurization above 15,000 feet. The pressure regulating valve for the gearbox maintains the pressure at 4.5 psid. If the gearbox pressurization system fails to regulate at 4.5 psid, the regulating valve will vent the gearbox to ambient at a maximum of 10 psid.
  - (b) Gearbox ventilation is included in the gearbox pressurization system. An air-oil separator centrifugally separates the oil from the air. Gearbox pressure is vented to the APU exhaust through the pressure regulating valve for the gearbox at all altitudes, and at 90-40% during every rolldown.
- (7) Oil Cooler (Fig. 6)
- (a) The oil cooler is an oil-air heat exchanger consisting of a rectangular core of plate-fin design. Air from the inlet plenum is blown through the oil cooler by a cooling fan which is operated by the gearbox. The bypass valve for the oil cooler is thermally actuated and bolted to the oil cooler header. When the oil is below 170°F the valve is open allowing the oil to bypass the cooler.

EFFECTIVITY

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49-27-00



Gearbox Pressurization System  
Figure 5

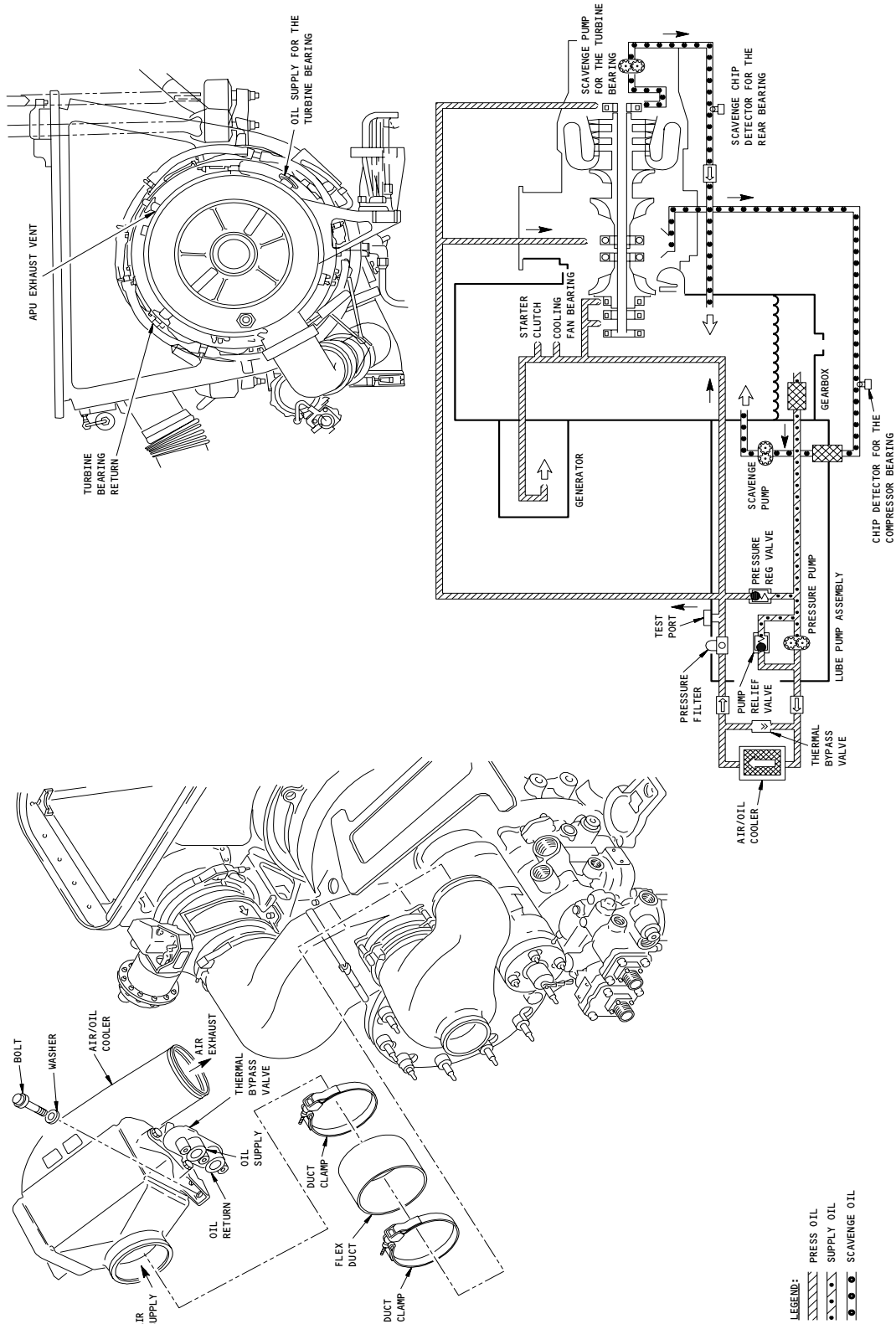
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49-27-00

02

Page 7  
May 10/92



Oil Cooler and Engine Bearing Scavenge System  
Figure 6

EFFECTIVITY

ALL

49-27-00

03

Page 8  
Dec 22/07

- (8) Scavenge System for the Engine Bearing (Fig. 6)
  - (a) The APU compressor bearings are scavenged by the scavenge pump located in the lube pump assembly. The turbine bearing is scavenged by a pump located in the bearing housing. This pump is driven by a gear on the engine main shaft. Scavenged oil is pumped back to the gearbox. Magnetic chip detectors on the scavenge return lines for the turbine bearing and compressor bearing can be inspected for possible bearing damage.

B. Generator Lubrication (Fig. 1)

- (1) The oil-cooled generator system includes the generator scavenge pump and a filter assembly consisting of an oil filter element, a differential pressure switch for the generator oil filter and a indicator for the oil filter. The system is supplied with oil by the main APU lube pump. It has, however, a separate scavenge pump operated by the gearbox, and a filter assembly. The double filter system isolates the APU and generator from each other in the event of a mechanical failure in one.
- (2) Generator Scavenge Pump (Fig. 7)
  - (a) The generator scavenge pump feeds generator cooling oil through the generator scavenge filter before the oil enters the oil reservoir. The pump is bolted to the gearbox case underneath the generator drive pad.
- (3) Filter Assembly for the Generator Scavenge (Fig. 7)
  - (a) The oil filter for the generator scavenge is a disposable fiberglass filter of the same design as the lube pump filter. It has a differential pressure indicator which pops out at 20  $\pm$ 5 psid. An electrical switch for the differential pressure initiates an APU automatic shutdown when the differential pressure across the filter is 35  $\pm$ 5 psid and the oil temperature is greater than 115  $\pm$ 25°F (46  $\pm$ 14°C).

3. Operation

A. Functional Description

- (1) During APU operation, oil is drawn from the oil reservoir by the lube pump. The oil pressure is regulated by the pressure regulating valve to 65 ( $\pm$ 5) psig. The oil flows through the oil cooler and filter element before being delivered to the generator and APU bearings and gears.
- (2) Oil from the turbine rotor bearing is returned to the oil reservoir by a pump contained within the bearing cavity. Oil from the compressor rotor bearing is returned by the scavenge pump for the lube pump assembly by the force of gravity into the oil reservoir. The gearbox is vented by an air-oil separator providing separation of entrained oil from the air.

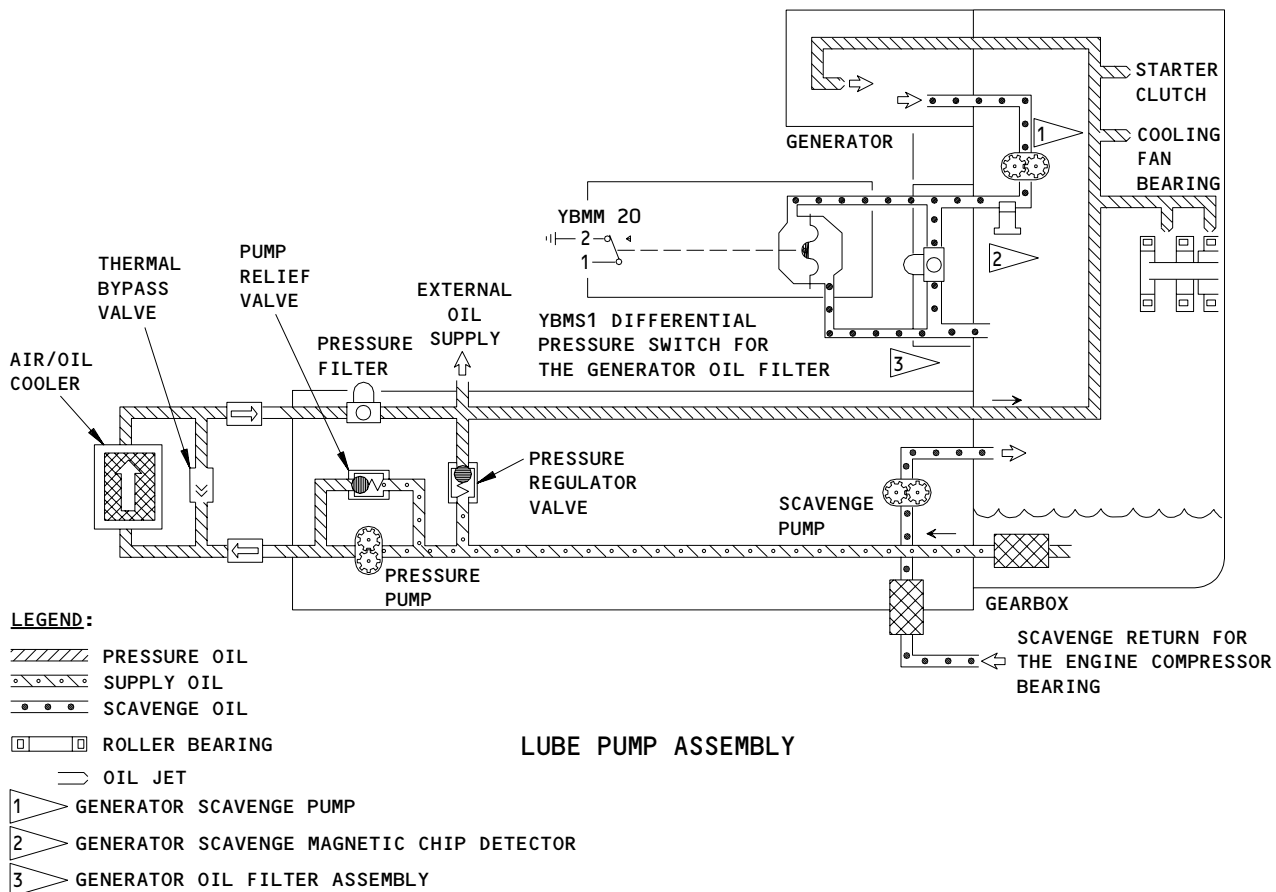
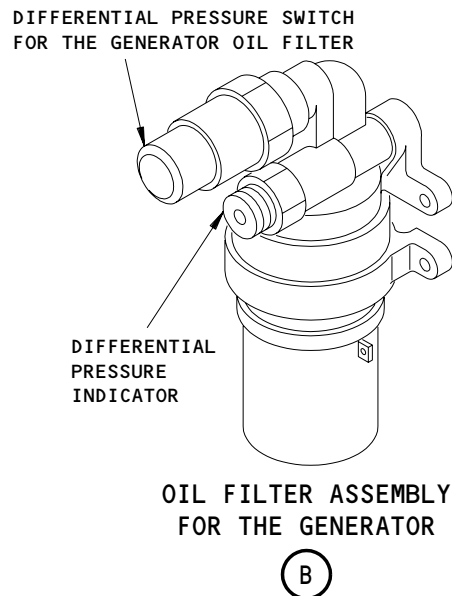
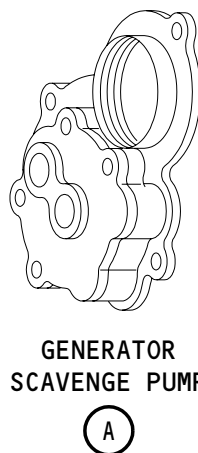
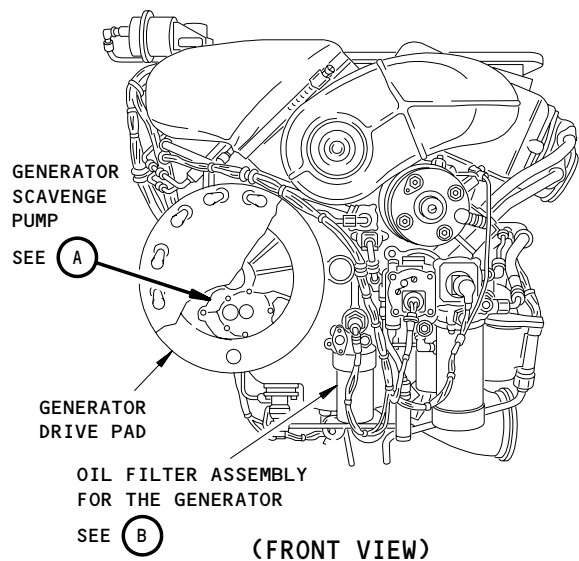
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49-27-00

08

Page 9  
Dec 22/07



Generator Oil Scavenge System  
Figure 7

EFFECTIVITY	
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49-27-00

B. BITE

- (1) The APU control unit monitors lubrication system operation and writes the faults it finds in BITE memory (AMM 49-61-00/001). A failure of the de-oil solenoid valve, the switch for the low oil pressure, the oil temperature sensor, or the differential pressure switch for the generator oil filter is shown on the FAULTY LRU matrix. These failures are shown as DEOIL SOL, LOP SWITCH, HOT SENSOR, or FILTER SW(GEN). An automatic shutdown because of HIGH OIL TEMP, LOW OIL PRESSURE, or GEN FILTER (a clogged generator oil filter) is shown on the REASON APU NOT OPERATING matrix.

EFFECTIVITY

ALL

49-27-00

07

Page 11  
Aug 22/99

 **BOEING**  
767  
FAULT ISOLATION/MAINT MANUAL

APU AND GENERATOR LUBRICATION SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
COOLER - OIL	1	1	315AL, 316AR, APU COMPT, UPPER COMPRESSOR SECTION	49-27-09
DETECTOR - COMPRESSOR BEARING MAGNETIC CHIP	4	1	315AL, 316AR, APU COMPT, LEFT SIDE OF GEARBOX	49-27-04
DETECTOR - GEARBOX MAGNETIC CHIP	4	1	315AL, 316AR, APU COMPT, BOTTOM OF GEARBOX	49-27-04
DETECTOR - GENERATOR SCAVENGE MAGNETIC CHIP	4	1	315AL, 316AR, APU COMPT, BOTTOM OF GEARBOX	49-27-04
DETECTOR - TURBINE BEARING MAGNETIC CHIP	4	1	315AL, 316AR, APU COMPT, RIGHT SIDE OF APU	49-27-04
ELEMENTS - LUBE AND GENERATOR SCAVENGE FILTER	2	2	315AL, 316AR, APU COMPT, GEARBOX ACCESSORIES	49-27-03
INDICATOR - GENERATOR FILTER DIFFERENTIAL PRESSURE	2	1	315AL, 316AR, APU COMPT, FRONT OF APU	49-27-16
INDICATOR - LUBE FILTER DIFFERENTIAL PRESSURE	2	1	315AL, 316AR, APU COMPT, GEARBOX ACCESSORIES	49-27-07
PLUG - DRAIN	4	1	315AL, 316AR, APU COMPT, BOTTOM OF GEARBOX	49-27-04
PUMP - GENERATOR SCAVENGE	2	1	315AL, 316AR, APU COMPT, FRONT OF APU	49-27-02
PUMP - LUBE	2	1	315AL, 316AR, APU COMPT, GEARBOX ACCESSORIES	49-27-01
REGULATOR - OIL PRESSURE	2	1	315AL, 316AR, APU COMPT, GEARBOX ACCESSORIES	49-27-05
SEAL PLATE - APU GENERATOR	3	1	315AL, 316AR, APU COMPT, FRONT OF GEARBOX	49-27-06
SENSOR - (FIM 49-94-00/101) OIL TEMPERATURE, YBMS1				
SWITCH - (FIM 49-94-00/101) LOW OIL PRESSURE, YBMS2	2	1	315AL, 316AR, APU COMPT, FRONT OF APU	49-27-15
SWITCH - GENERATOR FILTER DIFFERENTIAL PRESSURE, YBMS1	4	1	315AL, 316AR, APU COMPT, BOTTOM OF GEARBOX	49-27-14
SWITCH - LOW OIL TEMPERATURE, YBMS5				
TRANSMITTER - (FIM 49-94-00/101) OIL QUANTITY, YBMS3				
VALVE - DEOIL SOLENOID, YBMM3	3	1	315AL, 316AR, APU COMPT, FRONT OF GEARBOX	49-27-08
VALVE - GEARBOX PRESSURE REGULATING	3	1	315AL, 316AR, APU COMPT, FRONT OF GEARBOX	49-27-12
VALVE - GEARBOX SHUTOFF	3	1	315AL, 316AR, APU COMPT, RIGHT SIDE INLET PLENUM	49-27-11
VALVE - OIL COOLER BYPASS	1	1	315AL, 316AR, APU COMPT, UPPER COMPRESSOR SECTION	49-27-10
VALVE - SHUTTLE	3	1	315AL, 316AR, APU COMPT, RIGHT SIDE INLET PLENUM	49-27-13
UNIT - (FIM 49-61-00/101) APU CONTROL, M206				

APU and Generator Lubrication System - Component Index  
Figure 101

EFFECTIVITY

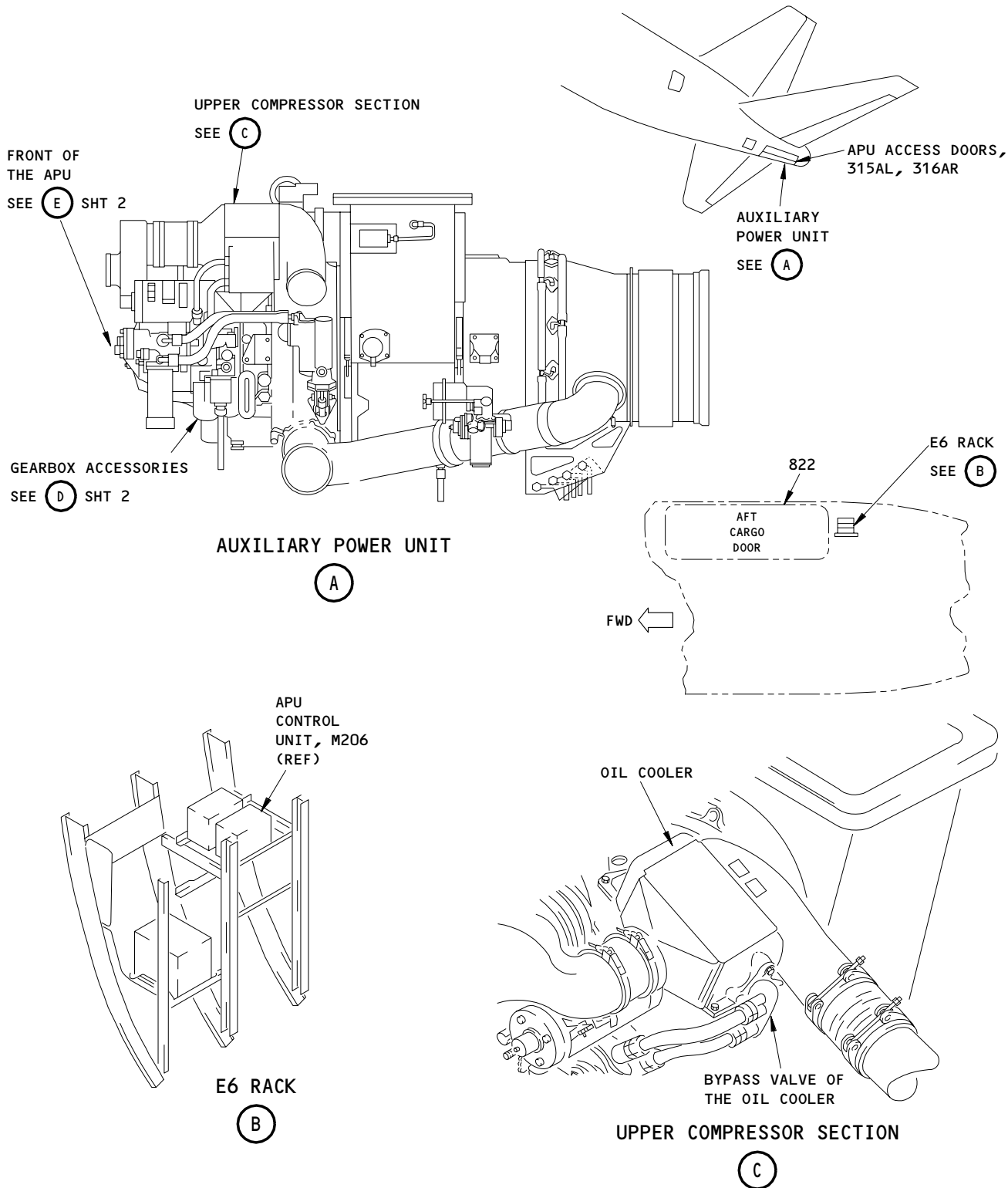
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Page 101  
Apr 22/99

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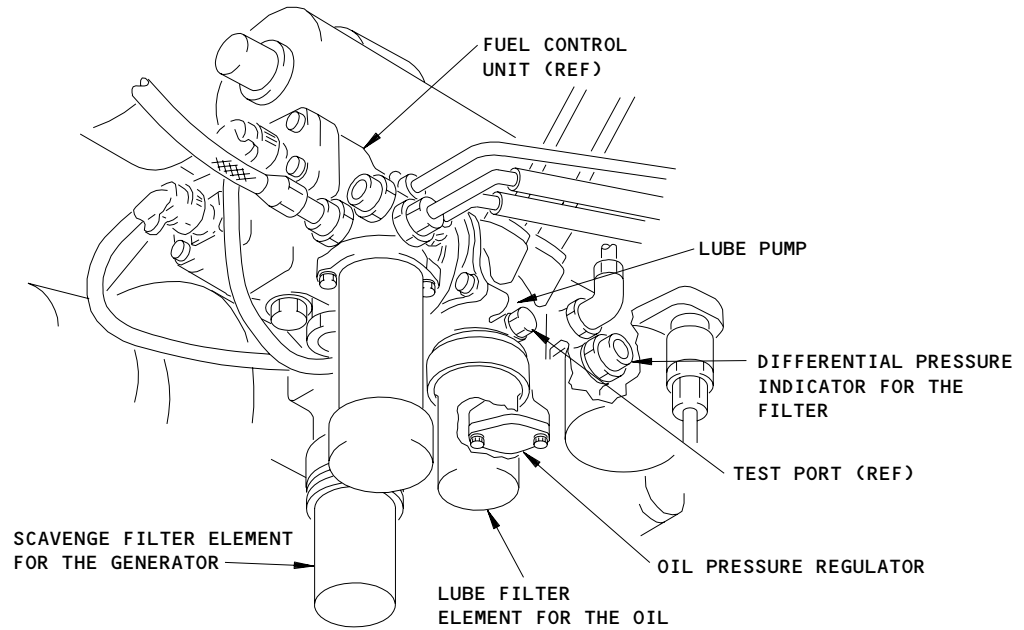


APU and Generator Lubrication System - Component Location  
Figure 102 (Sheet 1)

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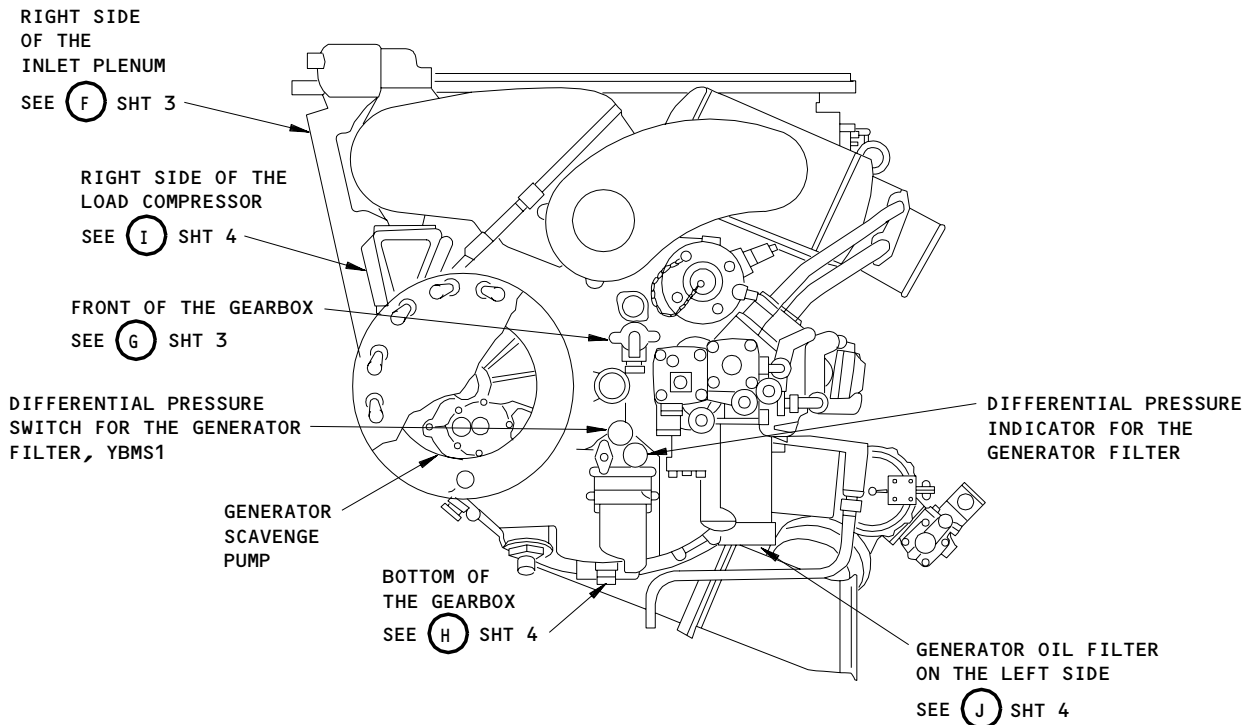
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**GEARBOX ACCESSORIES**

D



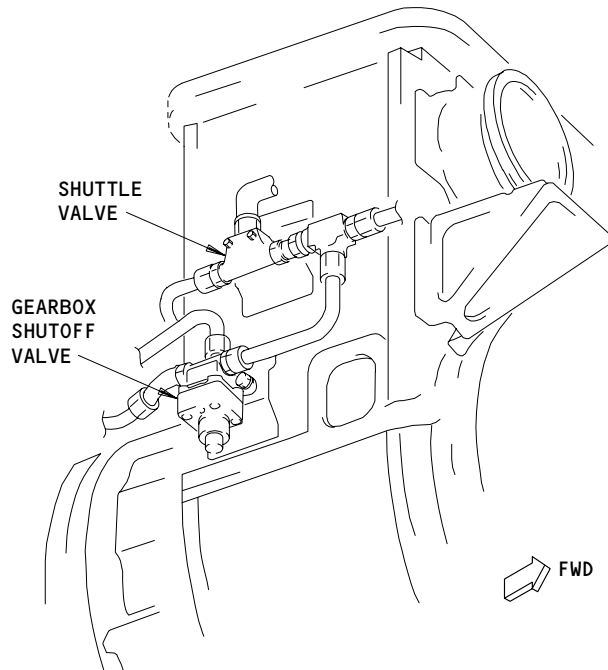
**FRONT OF THE APU**

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APU and Generator Lubrication System - Component Location (Details from Sht 1)  
Figure 102 (Sheet 2)

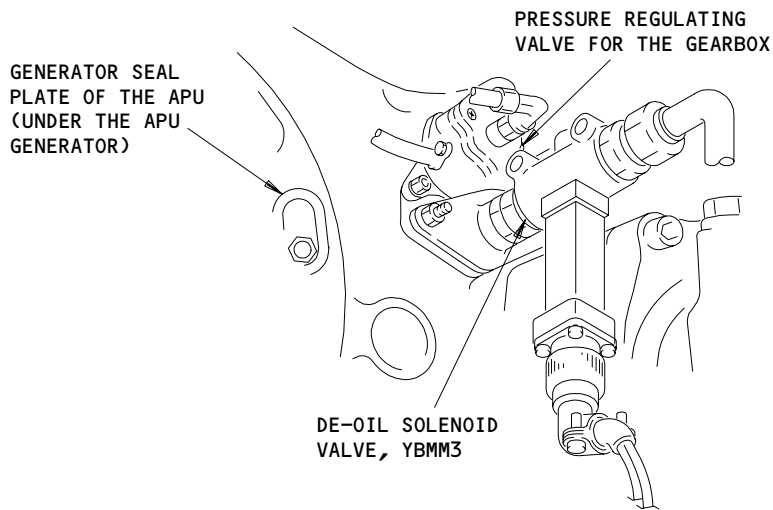
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RIGHT SIDE OF THE INLET PLENUM

F



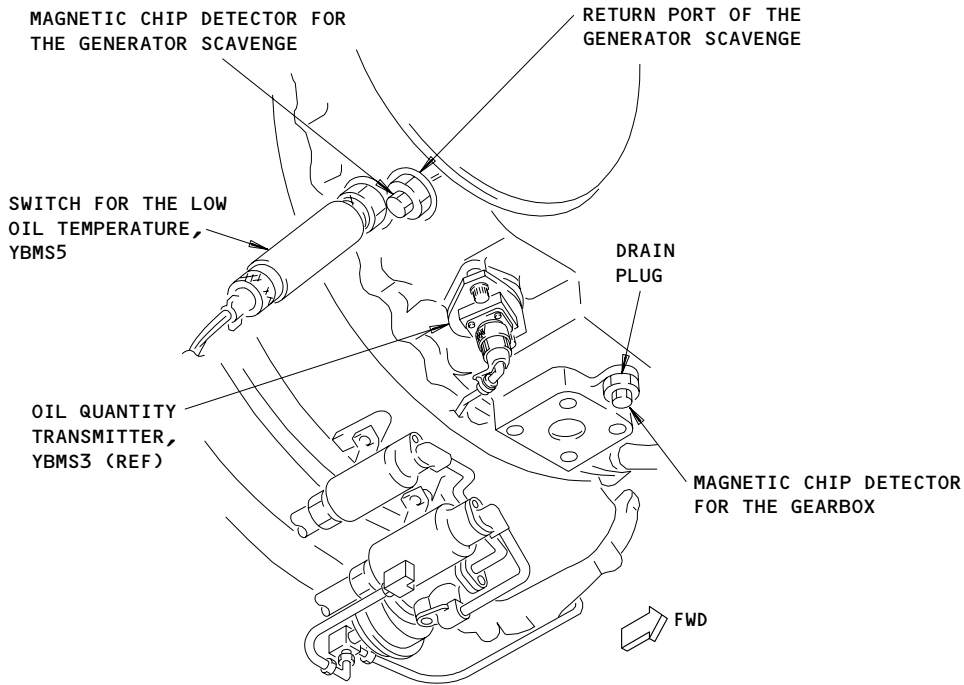
FRONT OF THE GEARBOX

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APU and Generator Lubrication System - Component Location (Details from Sht 2)  
Figure 102 (Sheet 3)

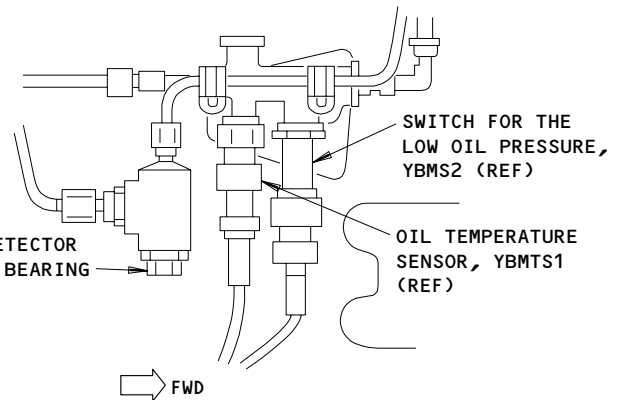
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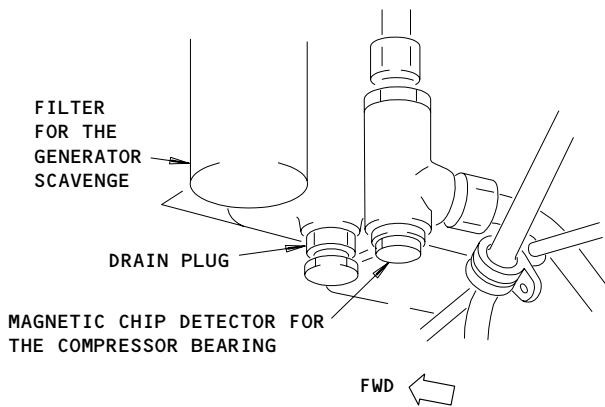
**BOTTOM OF THE GEARBOX**

**(H)**



**RIGHT SIDE OF THE LOAD COMPRESSOR**

**(I)**



**LEFT SIDE OF THE LOAD COMPRESSOR**

**(J)**

**APU and Generator Lubrication System - Component Location (Details from Sht 2)  
Figure 102 (Sheet 4)**

EFFECTIVITY	ALL
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**49-27-00**

APU AND GENERATOR LUBRICATION SYSTEM – SERVICING (OIL CHANGE)

1. General

- A. This procedure contains two tasks. The first task changes the APU oil with the same or different brand name and same type of oil. The second task changes the APU oil with a different type of oil.
- B. An oil reservoir is on the bottom of the gearbox. The reservoir has a quantity of 6.2 quarts. A manual fill port (with a scupper drain) is on the left side of the gearbox. There are also pressure fill fittings that are aft of the manual fill port.
- C. You can get access to the APU through the APU access doors.

TASK 49-27-00-603-001

2. APU Oil Change (Replace With the Same or Different Brand Name and Same Type of Oil) (Fig. 301)

- A. Standard Tools and Equipment
  - (1) Container – 2 U.S. Gallon (8 Liter) capacity, for oil
- B. Consumable Materials
  - (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
  - (2) D00341 Lubricant – Santovac 5
- C. References
  - (1) AMM 12-13-04/301, APU – Servicing (Fill the Oil)
  - (2) AMM 49-11-00/201, Auxiliary Power Unit
  - (3) AMM 49-27-03/401, Oil Filter Element
  - (4) AMM 49-27-04/601, Magnetic Chip Detectors and Drain Plugs
- D. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door
- E. Procedure
  - S 883-054
  - (1) If the oil in the APU is not hot, operate the APU to make the oil hot (AMM 49-11-00/201).

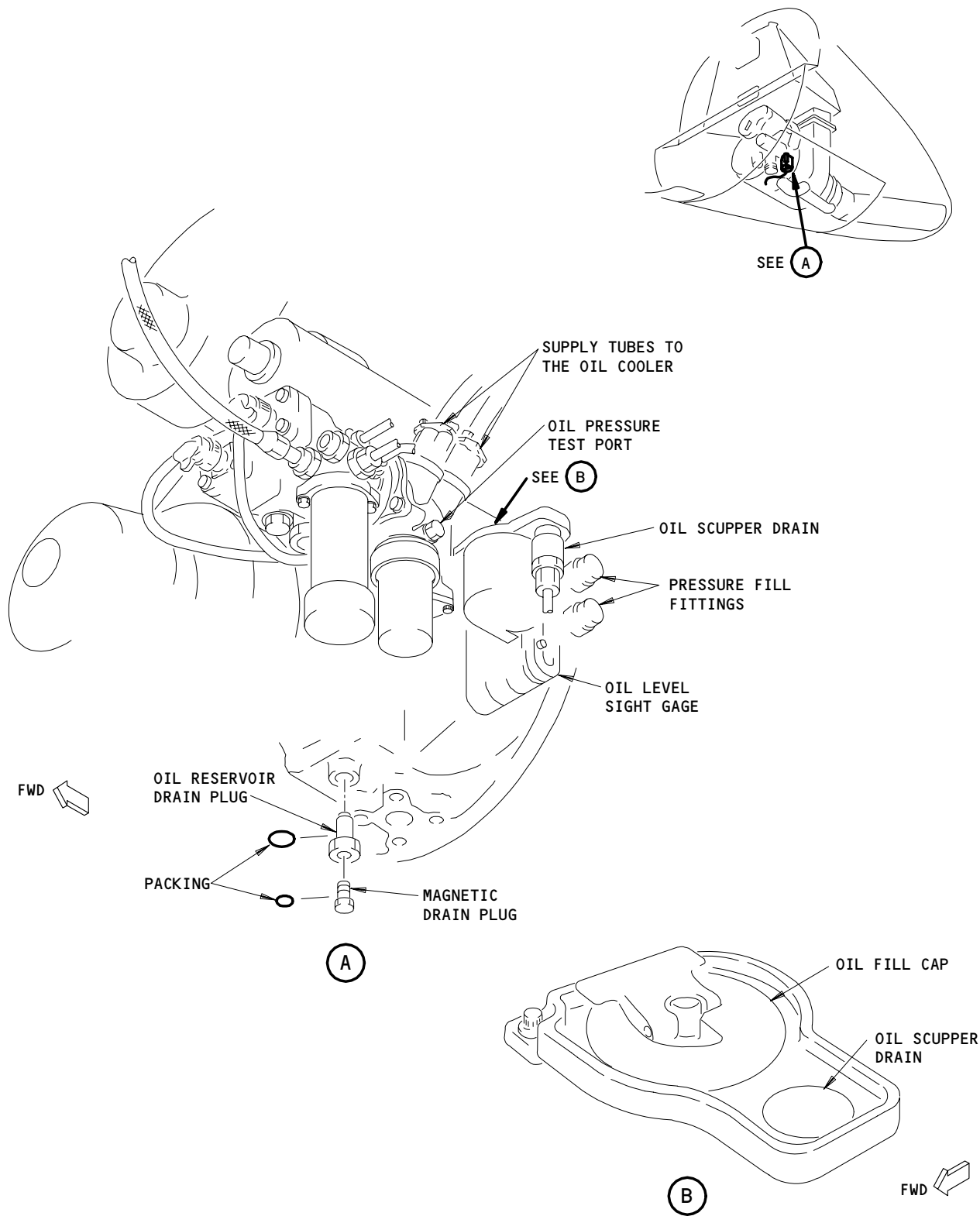
EFFECTIVITY

ALL

49-27-00

01

Page 301  
Dec 22/02



APU Oil Servicing  
Figure 301

EFFECTIVITY	
	ALL

49-27-00

01

Page 302  
Aug 10/91

- S 863-002
- (2) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

- S 863-003
- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

- S 013-005
- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) While you hold the left access door in the closed position, open the four latches on the right access door.  
  

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.
  - (b) Open the left access door to the fully open position and manually lock the hold-open strut.  
  

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.
  - (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.  
  

NOTE: The location of the detent latch is at the forward end of the right access door.
  - (d) Open the right access door to the fully open position and manually lock the hold-open strut.

- S 683-006
- (5) Drain the APU oil:
- (a) Loosen the oil fill cap on the APU.
  - (b) Put the container below the drain plug on the gearbox.

EFFECTIVITY

ALL

49-27-00

04

Page 303  
Aug 22/01

**WARNING:** DO NOT LET HOT OIL TOUCH YOU. STOP FOR 5 MINUTES AFTER AN ENGINE SHUTDOWN TO LET THE OIL SYSTEM PRESSURE GO TO ZERO. IF YOU OPEN THE OIL SYSTEM WHEN IT HAS PRESSURE, A SPRAY OF HOT OIL CAN BURN YOU.

DO NOT LET THE OIL REMAIN ON YOUR SKIN. YOU CAN ABSORB TOXIC MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL OF THE OIL THAT FALLS ON THE ENGINE PARTS. OIL CAN CAUSE DAMAGE TO PAINT AND TO SOME RUBBER PARTS.

- (c) Remove the drain plug from the bottom of the gearbox.
- (d) Remove the packing from the drain plug.
  - 1) Discard the packing.
- (e) Let all the oil drain from the gearbox.

S 213-009

- (6) Examine the drain plug for metal particles (AMM 49-27-04/601).

S 963-010

- (7) Replace the oil pressure and generator scavenge filter elements (AMM 49-27-03/401).

S 643-058

- (8) Lubricate the new packing with a light coat of lubricant or oil.

S 423-060

- (9) Install the packing on the drain plug.

S 423-061

- (10) Install the drain plug in the APU gearbox.
  - (a) Tighten the drain plug to 25-35 inch-pounds (2.8-4.0 newton-meters).
  - (b) Install a lockwire on the drain plug.

S 613-012

- (11) Fill the APU oil (AMM 12-13-04/301).

S 863-013

- (12) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-27-00

03

Page 304  
Dec 22/03

- 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 863-015

- (13) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 793-016

- (14) Do a leakage check for the APU:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) Make sure the APU operates correctly.
  - (c) Operate the APU for 3-5 minutes.
  - (d) During the APU operation, examine the APU for leakage.
  - (e) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 613-018

- (15) Stop for 5 minutes.

S 613-019

- (16) Make sure the APU oil is at the top of the fill port.

S 413-020

- (17) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-00

02

Page 305  
Aug 22/02



TASK 49-27-00-603-021

3. APU Oil Change (Replace With a Different Type of Oil) (Fig. 301)

A. Standard Tools and Equipment

- (1) Container - 2 U.S. Gallon (8 Liter) capacity, for oil

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or  
(2) D00341 Lubricant - Santovac 5

C. References

- (1) AMM 12-13-04/301, APU - Servicing (Fill the Oil)  
(2) AMM 49-11-00/201, Auxiliary Power Unit  
(3) AMM 49-27-03/401, Oil Filter Element  
(4) AMM 49-27-04/601, Magnetic Chip Detectors and Drain Plugs

D. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |
| 822   | Aft Cargo Door          |

E. Procedure

S 883-055

- (1) If the oil in the APU is not hot, operate the APU to make the oil hot (AMM 49-11-00/201).

S 863-022

- (2) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 863-023

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:  
(a) P11 Overhead Panel  
1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-27-00

05

Page 306  
Dec 22/02

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 013-025

- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 683-026

- (5) Drain the APU oil:

- (a) Put the container below the APU oil cooler.

WARNING: DO NOT LET HOT OIL TOUCH YOU. STOP FOR 5 MINUTES AFTER AN ENGINE SHUTDOWN TO LET THE OIL SYSTEM PRESSURE GO TO ZERO. IF YOU OPEN THE OIL SYSTEM WHEN IT HAS PRESSURE, A SPRAY OF HOT OIL CAN BURN YOU.

DO NOT LET THE OIL REMAIN ON YOUR SKIN. YOU CAN ABSORB TOXIC MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. OIL CAN CAUSE DAMAGE TO PAINT AND TO SOME RUBBER PARTS.

- (b) Disconnect the oil tubes from the APU oil cooler.
- (c) Let the oil fully drain from the tubes.
- (d) Connect the oil tubes to the APU oil cooler.

EFFECTIVITY

ALL

49-27-00

05

Page 307  
Aug 22/02

- (e) Put the container below the drain plug on the bottom of the gearbox.
- (f) Loosen the oil fill cap.
- (g) Remove the drain plug on the bottom of the gearbox.
- (h) Remove the packing from the drain plug.
  - 1) Discard the packing.
- (i) Let the oil fully drain from the APU gearbox.

S 963-032

- (6) Replace the oil pressure and generator scavenge filter elements (AMM 49-27-03/401)

S 213-033

- (7) Examine the magnetic drain plug for metal particles (AMM 49-27-04/601).

S 643-062

- (8) Lubricate the new packing with a light coat of lubricant or oil.

S 423-064

- (9) Install the packing on the drain plug.

S 423-065

- (10) Install the drain plug in the APU gearbox.
  - (a) Tighten the drain plug to 25-35 inch-pounds (2.8-4.0 newton-meters).

NOTE: Do not install a lockwire on the drain plug at this time.

S 613-036

- (11) Fill the APU oil (AMM 12-13-04/301).

S 863-041

- (12) Motor the APU for 30 seconds to fill all of the oil tubes (AMM 49-11-00/201).

S 613-042

- (13) Make sure the oil level is at the top of the oil fill port.

S 793-043

- (14) Do a leakage check of the APU:
  - (a) Do this task: APU Start and Operation (AMM 49-11-00/201).

EFFECTIVITY

ALL

49-27-00

04

Page 308  
Dec 22/03

- (b) Make sure the APU operates correctly.
- (c) Operate the APU for 5 minutes.
- (d) During the APU operation, examine the APU for leakage.
- (e) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 683-045

- (15) Drain the APU oil:
  - (a) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
  - (b) Open these circuit breakers and attach DO-NOT-CLOSE tags:
    - 1) P11 Overhead Panel
      - a) 11B35, APU ALTN CONT
    - 2) P49 APU Auxiliary Panel
      - a) 49C2, APU PRIME CONT
      - b) 49C3, APU START

**WARNING:** DO NOT LET HOT OIL TOUCH YOU. STOP FOR 5 MINUTES AFTER AN ENGINE SHUTDOWN TO LET THE OIL SYSTEM PRESSURE GO TO ZERO. IF YOU OPEN THE OIL SYSTEM WHEN IT HAS PRESSURE, A SPRAY OF HOT OIL CAN BURN YOU.

DO NOT LET THE OIL TOUCH YOUR SKIN FOR A LONG TIME. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. OIL CAN CAUSE DAMAGE TO PAINT AND TO SOME RUBBER PARTS.

- (c) Put the container below the drain plug on the bottom of the gearbox.
- (d) Loosen the oil fill cap.
- (e) Remove the drain plug on the bottom of the gearbox.
- (f) Let the oil fully drain from the gearbox.
- (g) Install the drain plug in the bottom of the gearbox.

EFFECTIVITY

ALL

49-27-00

04

Page 309  
Dec 22/07

- (h) Tighten the drain plug to 25-35 inch-pounds (2.8-4.0 newton-meters).
- (i) Install a lockwire on the drain plug.

S 613-056

- (16) Fill the APU oil (Ref 12-13-04/301).

S 863-046

- (17) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 863-048

- (18) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 793-049

- (19) Do a leakage check of the APU:
  - (a) Do this task: APU Start and Operation (AMM 49-11-00/201).
  - (b) Make sure the APU operates correctly.
  - (c) Operate the APU for 3-5 minutes.
  - (d) During the APU operation, examine the APU for leakage.
  - (e) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 613-051

- (20) Stop for 5 minutes.

S 613-052

- (21) Make sure the oil level is at the top of the oil fill port:
  - (a) Remove the oil fill cap.
  - (b) Make sure the oil level is at the top of the fill port.
  - (c) Install the oil fill cap.

S 413-053

- (22) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

EFFECTIVITY

ALL

49-27-00

04

Page 310  
Dec 22/03

 **BOEING**  
767  
MAINTENANCE MANUAL

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-00

01

Page 311  
Apr 22/00

APU AND GENERATOR LUBRICATION SYSTEM – INSPECTION/CHECK

1. General

- A. This procedure contains a task to do a check of the APU oil level with the EICAS system. This task is done in the airplane flight compartment.

TASK 49-27-00-206-002

2. APU Oil Level Check

A. References

- (1) AMM 12-13-04/301, APU Servicing (Fill the Oil)  
(2) AMM 24-22-00/201, Control (Supply Power)

B. Procedure

S 866-001

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

S 866-003

- (2) Make sure the EICAS circuit breakers on the P11 panel are closed.

S 216-004

- (3) Examine the APU oil level:

- (a) Push the PERF/APU switch on the maintenance control panel for the EICAS.  
(b) Read the APU oil level.  
(c) If a low oil quantity is shown, fill the APU oil reservoir (Ref 12-13-04/301).

S 866-005

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

EFFECTIVITY

ALL

49-27-00

01

Page 601  
Apr 22/99

LUBE PUMP - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the lube pump.
- B. The lube pump is on the gearbox. The lube pump is a mounting pad for the fuel control unit. You must remove the fuel control unit before you remove the lube pump.
- C. You can get access to the lube pump through the APU access doors.

TASK 49-27-01-004-001

2. Lube Pump Removal (Fig. 401)

- A. References
  - (1) AMM 49-31-01/401, Fuel Control Unit
- B. Equipment
  - (1) Container - Oil Resistant, 1 Gallon (4 Liters)
- C. Access
  - (1) Location Zones
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right

D. Procedure

S 024-012

- (1) Do this task: Fuel Control Unit Removal (AMM 49-31-01/401).

S 024-011

**CAUTION:** IF YOU REMOVE THE LUBE PUMP BECAUSE OF A BROKEN SHAFT, MAKE SURE YOU EXAMINE THE OTHER OIL SYSTEM COMPONENTS. A BROKEN SHAFT IS USUALLY CAUSED BY METAL PARTICLES CAUGHT IN THE LUBE PUMP GEARS. IT IS POSSIBLE THAT THE METAL PARTICLES CAME FROM A DIFFERENT DEFECTIVE COMPONENT. YOU MUST REPLACE THE DEFECTIVE COMPONENT BEFORE YOU INSTALL THE NEW OR SERVICEABLE LUBE PUMP. DAMAGE TO THE NEW OR SERVICEABLE LUBE PUMP CAN OCCUR.

- (2) Do these steps to remove the lube pump (19):

EFFECTIVITY

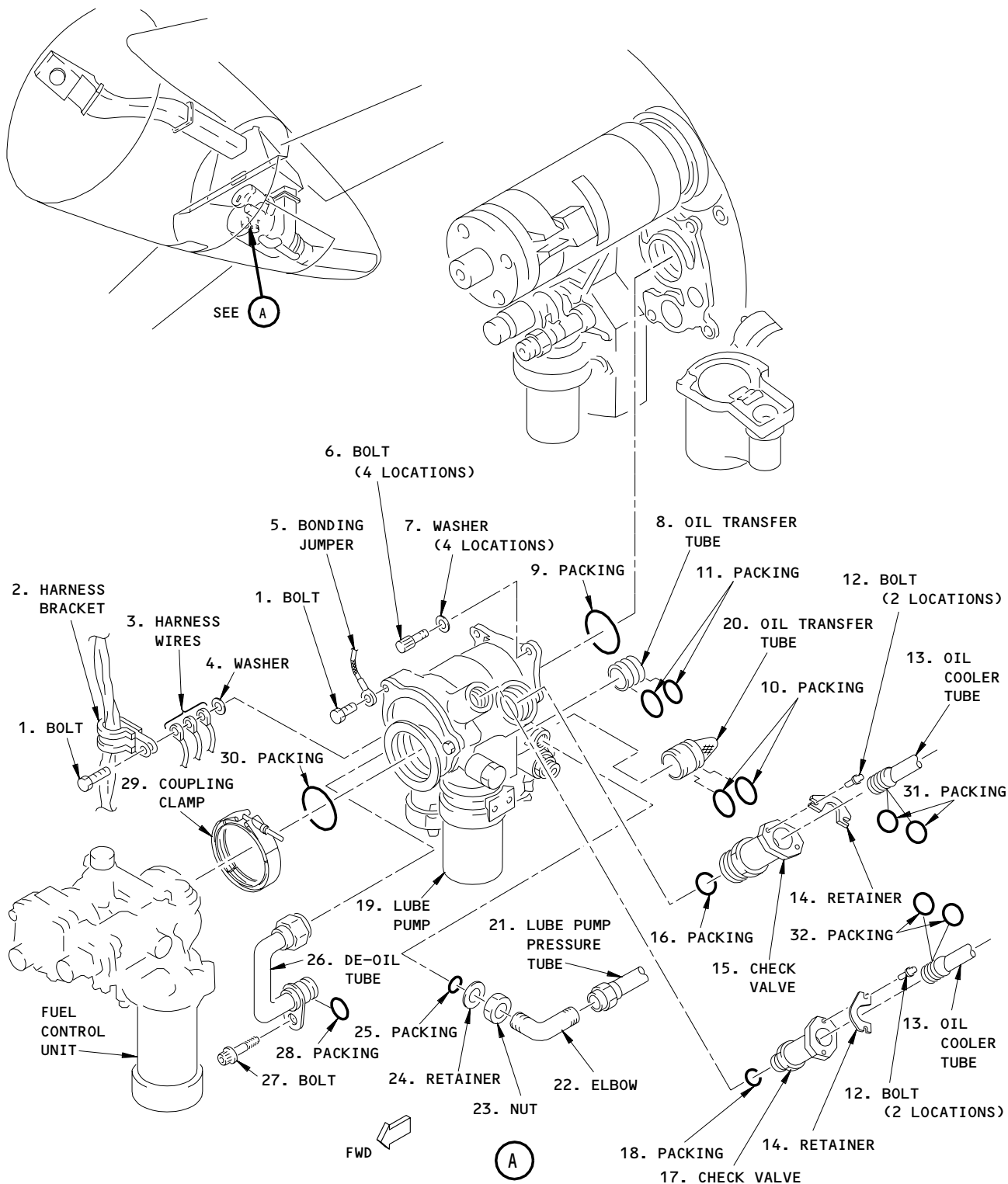
ALL

49-27-01

01

Page 401  
Aug 22/03





Lube Pump Installation  
Figure 401

EFFECTIVITY

ALL

49-27-01

01

Page 402  
Aug 22/03

(a) Put the container below the lube pump.

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (b) Disconnect the mid-bearing scavenge tube from the bottom of the lube pump (19).
- (c) Remove the four bolts (12) and two retainers (14) that attach the two oil cooler tubes (13) to the two check valves (15), (17).
- (d) Disconnect the two oil cooler tubes (13) from the two check valves (15), (17).
- (e) Remove the two packings (31) and two packings (32) from the two oil cooler tubes (13).
  - 1) Discard the two packings (31) and two packings (32).
- (f) Remove the two check valves (15), (17) and the two packings (16), (18) from the lube pump (19).
  - 1) Discard the two packings (16), (18).
- (g) Disconnect the lube pump pressure tube (21) from the elbow (22).
- (h) Remove the elbow (22), nut (23), retainer (24) and packing (25).
  - 1) Discard the packing (25).
- (i) Do these steps to remove the de-oil tube (26) from the de-oil solenoid valve and lube pump (19):
  - 1) Remove the bolt (27) that attaches the de-oil tube (26) to the lube pump (19).
  - 2) Remove the de-oil tube (26) from the de-oil solenoid valve.
  - 3) Remove and discard the packing (28).
- (j) Remove the bolt (1), disconnect the bonding jumper (5) from the lube pump (19) and re-install the bolt (1).
- (k) Remove the bolt (1) and washer (4) that attach the harness bracket (2) and three harness wires (3) to the lube pump (19).
- (l) Remove the four bolts (6) and four washers (7) that attach the lube pump (19) to the APU.
- (m) Remove the lube pump (19) and packing (9) from the APU.
  - 1) Discard the packing (9).
- (n) Remove the two oil transfer tubes (8), (20).
  - 1) Remove and discard the four packings (10), (11) from the two oil transfer tubes (8), (20).
- (o) Install protective caps on the two oil cooler tubes (13).

EFFECTIVITY

ALL

49-27-01

01

Page 403  
Aug 22/03

(p) Remove the container.

TASK 49-27-01-404-005

3. Lube Pump Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-31-01/401, Fuel Control Unit

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	9	Packing	49-27-00	01	200
	10	Packing			195
	11	Packing			189
	16	Packing			260
	18	Packing			250
	19	Lube Pump Assembly			145
	25	Packing	480		
	28	Packing	49-27-08	01	120
	30	Packing	49-31-00	01	154
	31	Packing	49-27-00	01	230
	32	Packing			240

D. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

E. Procedure

S 424-007

- (1) Do these steps to install the lube pump (19):
  - (a) Lubricate the four new packings (10), (11) with a light coat of lubricant or oil.
  - (b) Install the four packings (10), (11) on the two oil transfer tubes (8), (20).
  - (c) Install the two oil transfer tubes (8), (20) in the APU gearbox.

EFFECTIVITY

ALL

**49-27-01**

01

Page 404  
Aug 22/05

- (d) Lubricate the new packing (9) with a light coat of lubricant or oil.
- (e) Install the packing (9) on the lube pump (19).
- (f) Attach the lube pump (19) to the APU gearbox with the four bolts (6) and four washers (7).
  - 1) Tighten the four bolts (6) to 120-125 inch-pounds (13.6-14.1 newton-meters).
- (g) Attach the harness bracket (2) and three harness wires (3) to the lube pump (19) with the bolt (1) and washer (4).
- (h) Remove the bolt (1) from the lube pump (19), attach the bonding jumper (5) and re-install the bolt (1).
  - 1) Tighten the two bolts (1) to 25-30 inch-pounds (2.8-3.4 newton-meters).
- (i) Remove the protective caps from the two oil cooler tubes (13).
- (j) Do these steps to connect the de-oil tube (26) to the de-oil solenoid valve and lube pump (19):
  - 1) Lubricate the new packing (28) with a light coat of lubricant or oil.
  - 2) Install the packing (28) on the de-oil tube (26).
  - 3) Connect the de-oil tube (26) to the de-oil solenoid valve and lube pump (19).
  - 4) Install the bolt (27) that attaches the de-oil tube (26) to the lube pump (19).
- (k) Do these steps to connect the lube pump pressure tube (21) to the lube pump (19):
  - 1) Lubricate the new packing (25) with a light coat of lubricant or oil.
  - 2) Install the packing (25) on the lube pump (19).
  - 3) Install the elbow (22) on the lube pump (19) with the nut (23) and retainer (24).
  - 4) Connect the lube pump pressure tube (21) to the elbow (22).
- (l) Do these steps to install the two check valves (15), (17) on the lube pump (19):
  - 1) Lubricate the two new packings (16), (18) with a light coat of lubricant or oil.
  - 2) Install the two packings (16), (18) on the two check valves (15), (17).
  - 3) Install the two check valves (15), (17) on the lube pump (19).
  - 4) Tighten the two check valves (15), (17) to 300-460 inch-pounds (33.9-52.0 newton-meters).

EFFECTIVITY

ALL

49-27-01

01

Page 405  
Aug 22/03

- (m) Do these steps to connect the two oil cooler tubes (13) to the two check valves (15), (17):
  - 1) Lubricate the two packings (31) and two packings (32) with a light coat of lubricant or oil.
  - 2) Install the two packings (31) on the oil cooler tube (13).
  - 3) Install the two packings (32) on the oil cooler tube (13).
  - 4) Connect the two oil cooler tubes (13) to the two check valves (15), (17) with the two retainers (14) and four bolts (12).
  - 5) Tighten the four bolts (12) to 50-55 inch-pounds (5.7-6.2 newton-meters).
- (n) Connect the mid-bearing scavenge tube to the bottom of the lube pump (19).

S 424-013

- (2) Do this task: Fuel Control Unit Installation (AMM 49-31-01/401).

S 794-009

- (3) Do a leakage check of the lube pump installation:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the lube pump for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found oil leakage, repair the cause of it.

EFFECTIVITY

ALL

49-27-01

01

Page 406  
Aug 22/03

GENERATOR SCAVENGE PUMP – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the generator scavenge pump.
- B. The generator scavenge pump is on the gearbox behind the generator. You must remove the generator to remove the generator scavenge pump.
- C. You can get access to the generator scavenge pump through the APU access doors.

TASK 49-27-02-004-001

2. Generator Scavenge Pump Removal (Fig. 401)

- A. References
  - (1) AMM 24-21-01/401, APU Generator
- B. Access
  - (1) Location Zones
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door

C. Procedure

S 024-009

- (1) Do this task: APU Generator Removal (AMM 24-21-01/401).

S 024-003

- (2) Do these steps to remove the generator scavenge pump (5):
  - (a) Remove the three bolts (1) and three washers (2) that attach the generator scavenge pump (5) to the gearbox.
  - (b) Remove the generator scavenge pump (5) and two packings (3), (4) from the gearbox.
    - 1) Discard the two packings (3), (4).

TASK 49-27-02-404-004

3. Generator Scavenge Pump Installation (Fig. 401)

- A. References
  - (1) AMM 12-13-04/301, APU Servicing

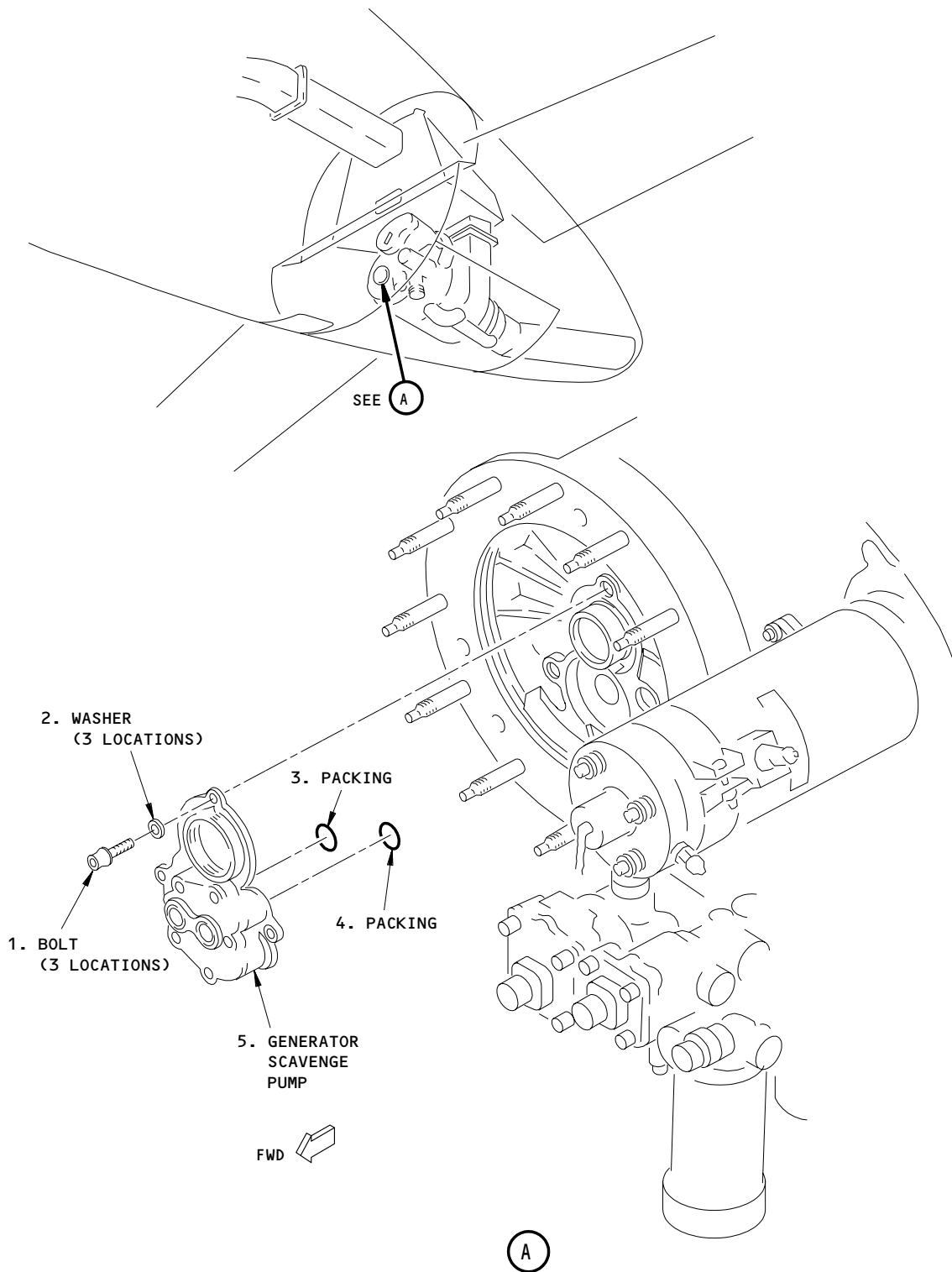
EFFECTIVITY

ALL

49-27-02

01

Page 401  
Dec 22/03



Generator Scavenge Pump Installation  
Figure 401

EFFECTIVITY

ALL

49-27-02

01

Page 402  
Dec 22/03

- (2) AMM 24-21-01/401, APU Generator
- (3) AMM 49-11-00/201, Auxiliary Power Unit
- B. Consumable Materials
  - (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
  - (2) D00341 Lubricant - Santovac 5
- C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Packing	49-27-02	01	65
	4	Packing			70
	5	Generator Scavenge Pump Assembly			50

- D. Access
  - (1) Location Zones
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right

E. Procedure

- S 424-005
  - (1) Do these steps to install the generator scavenge pump (5):
    - (a) Lubricate the two new packings (3), (4) with a light coat of lubricant or oil.
    - (b) Install the two packings (3), (4) on the generator scavenge pump (5).
    - (c) Attach the generator scavenge pump (5) to the gearbox with the three washers (2) and three bolts (1).
      - 1) Tighten the three bolts (1) to 50 inch-pounds (5.7 newton-meters).
- S 424-010
  - (2) Do this task: APU Generator Installation (AMM 24-21-01/401).
- S 794-007
  - (3) Do these steps to examine the APU generator for oil leakage:
    - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
    - (b) During the APU operation, examine the APU generator for oil leakage.
    - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
    - (d) If you found oil leakage, repair the cause of it.

EFFECTIVITY

ALL

**49-27-02**

01

Page 403  
Aug 22/05



LUBE AND GENERATOR SCAVENGE FILTER ELEMENTS – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the Lube and Generator Scavenge Filter Elements
  - (2) An Installation of the Lube and Generator Scavenge Filter Elements.
- B. To do these tasks, you must get access to the APU. You can get access to the APU through the APU access doors.

TASK 49-27-03-004-001

2. Lube and Generator Scavenge Filter Elements Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

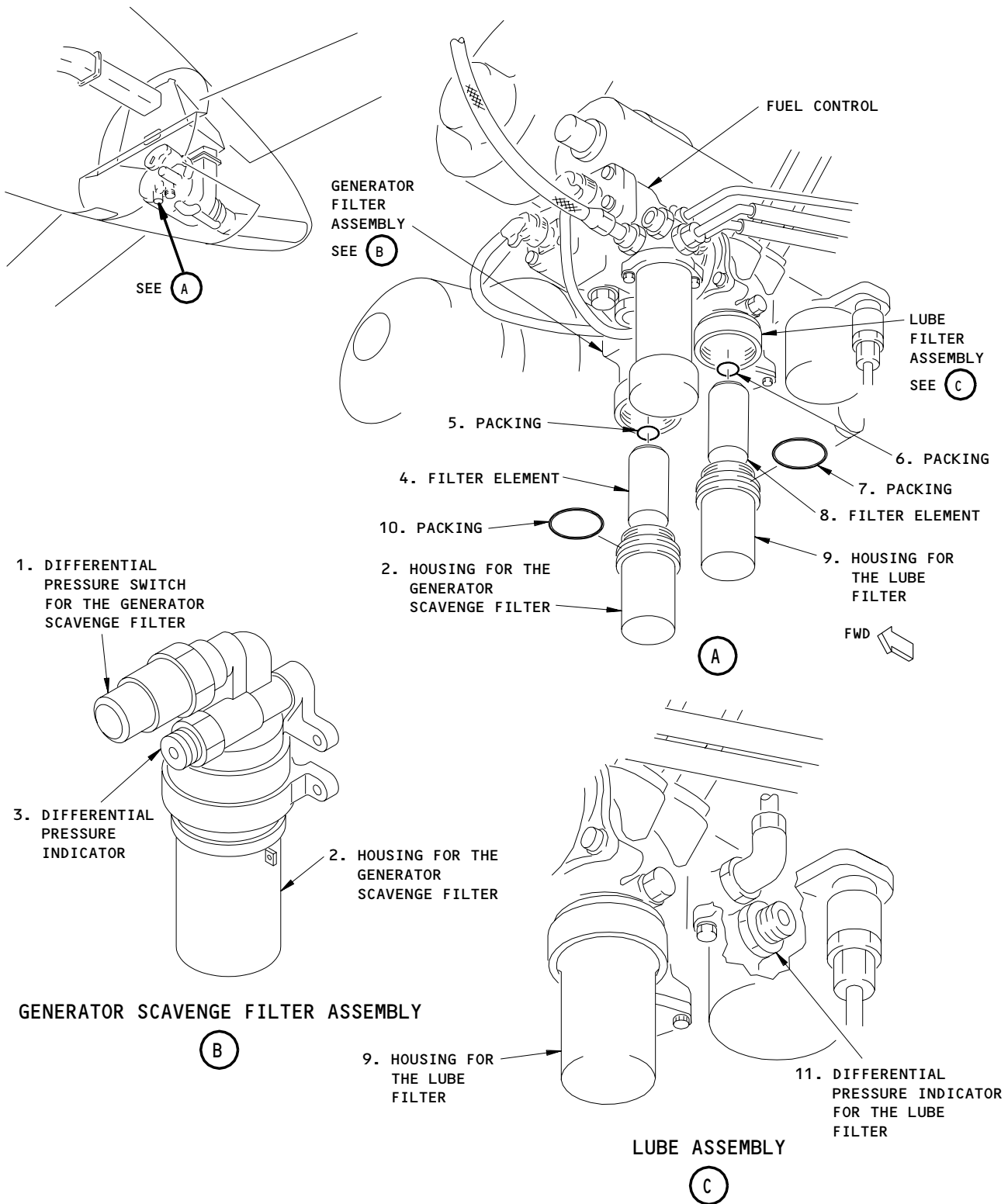
EFFECTIVITY

ALL

49-27-03

03

Page 401  
Aug 22/01



Lube and Generator Scavenge Filter Elements Installation  
Figure 401

EFFECTIVITY	
	ALL

49-27-03

2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the lube and the scavenge filter elements:

(a) Remove the lockwire from the scavenge filter housing (2) and the lube filter housing (9).

WARNING: DO NOT KEEP THE OIL ON YOUR SKIN FOR A LONG TIME. IF YOU DO NOT CLEAN THE OIL OFF YOUR SKIN, THE OIL CAN CAUSE INJURY.

(b) Remove the scavenge filter housing (2) and the lube filter housing (9).

(c) Remove the packings (7 and 10) from the scavenge filter housing (2) and the lube filter housing (9).  
1) Discard the packings (7 and 10).

(d) Remove the filter elements (4 and 8) and the packings (5 and 6) from the scavenge filter housing (2) and the lube filter housing (9).

EFFECTIVITY

ALL

49-27-03

02

Page 403  
Aug 22/01

- (e) Do the inspection of the filter elements (4 and 8). Do this task: Lube and Generator Scavenge Filter Elements Inspection (AMM 49-27-03/601).

NOTE: This will give you an indication of the condition of the generator.

- (f) Discard the packings (5 and 6) and the filter elements (4 and 8).

TASK 49-27-03-404-006

3. Lube and Generator Scavenge Filter Elements Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU - Servicing (Fill the Oil)  
(2) AMM 49-11-00/201, Auxiliary Power Unit

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or  
(2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Oil Filter Element Assembly	49-27-03	01	80
	5	Packing			85
	6	Packing	49-27-00	01	175
	7	Packing			170
	8	Oil Filter Element Assembly			172
	10	Packing	49-27-03	01	75

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

EFFECTIVITY

ALL

**49-27-03**

01

Page 404  
Aug 22/03

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the lube and the scavenge filter elements:
  - (a) Lubricate the new packings (5, 6, 7, and 10) with a light coat of lubricant or oil.
  - (b) Install the packings (5 and 6) on the filter elements (4 and 8).
  - (c) Momentarily put the filter elements (4 and 8) in a container of oil.
  - (d) Install the filter elements (4 and 8) in the scavenge filter housing (2) and the lube filter housing (9).
  - (e) Install the packings (7 and 10) on the lube filter housing (9) and the scavenge filter housing (2).
  - (f) Install the scavenge filter housing (2) and the lube filter housing (9) on the APU.
    - 1) Tighten the filter housings (2 and 9) with your hands.
    - 2) Install lockwires on the scavenge filter housing (2) and the lube filter housing (9).

S 864-008

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 794-026

- (4) Do the installation test for the lube and generator scavenge filter elements:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) Operate the APU for a minimum of five minutes.
  - (c) During the APU operation, examine the lube and generator scavenge filter housings for signs of oil leakage.
  - (d) If you find oil leakage, then do these steps to repair the leakage:
    - 1) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
    - 2) Attach a DO-NOT-OPERATE tag to the APU control switch on the P5 overhead panel.
    - 3) Repair the cause of the oil leakage.

EFFECTIVITY

ALL

49-27-03

04

Page 405  
Apr 22/03

 **BOEING**  
767  
MAINTENANCE MANUAL

- 4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.
  - 5) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - 6) During the APU operation, examine the lube and generator scavenge filter housings for signs of oil leakage.
  - 7) If you find oil leakage, do the leakage repair again.
- (e) If it is not necessary to do other tasks, do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 214-027

- (5) Make sure the APU oil system is full. To check the oil level, do this task: APU Oil Level Inspection (AMM 12-13-04/301).

F. Put the Airplane Back to its Usual Condition

S 414-023

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-03

01

Page 406  
Apr 22/03

LUBE AND GENERATOR SCAVENGE FILTER ELEMENTS - INSPECTION/CHECK

1. General

- A. This procedure has the task to inspect the lube and generator scavenge filter elements. The two filter elements are on the lube module.

TASK 49-27-03-206-012

2. Lube and Generator Scavenge Filter Elements Inspection

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-27-00/301, APU and Generator Servicing (Oil Change)
- (3) AMM 49-27-03/401, Lube and Generator Scavenge Filter Elements

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 866-028

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-029

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

**49-27-03**

04

Page 601  
Aug 22/01

 **BOEING**  
767  
MAINTENANCE MANUAL

2) 49C3, APU START

S 016-027

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-026

- (4) Do the visual inspection of the lube and generator scavenge filter elements.

S 026-032

- (5) If they are installed, remove the elements for the lube and the generator scavenge filters. Do this task: Lube and Generator Scavenge Filter Elements Removal (AMM 49-27-03/401).

S 216-014

- (6) Examine the filter elements:

(a) Examine the filter housings for nicks, dents, and cracks.

(b) Examine the filter elements for metal particles and other unwanted materials.

NOTE: The oil condition will give you an indication of the internal damage to the APU.

EFFECTIVITY

ALL

49-27-03

03

Page 602  
Aug 22/01



S 176-015

- (7) If you found metal particles, flush the APU oil system:
- (a) Install the elements for the lube and the generator scavenge filters. Do this task: Lube and Generator Scavenge Filter Elements Installation (AMM 49-27-03/401).
  - (b) Change the APU oil (AMM 49-27-00/301).
  - (c) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (d) Let the APU operate for 15 minutes.
  - (e) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

S 216-016

- (8) Examine the filter elements again:
- (a) Remove the elements for the lube and the generator scavenge filters. Do this task: Lube and Generator Scavenge filter Elements Removal (AMM 49-27-03/401).
  - (b) Examine the filter elements for metal particles and other unwanted materials.
  - (c) More metal particles are not permitted.

S 426-031

- (9) Install the elements for the lube and generator scavenge filters. Do this task: Lube and Generator Scavenge Filter Elements Installation (AMM 49-27-03/401).

S 416-030

- (10) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

TASK 49-27-03-206-018

3. Filter Elements Differential Pressure Indicators Check

A. References

- (1) AMM 49-27-07/401, Lube Filter Differential Pressure Indicator
- (2) AMM 49-27-16/401, Generator Filter Differential Pressure Indicator

EFFECTIVITY

ALL

49-27-03

01

Page 603  
Aug 22/01

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 866-019

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-020

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 016-021

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

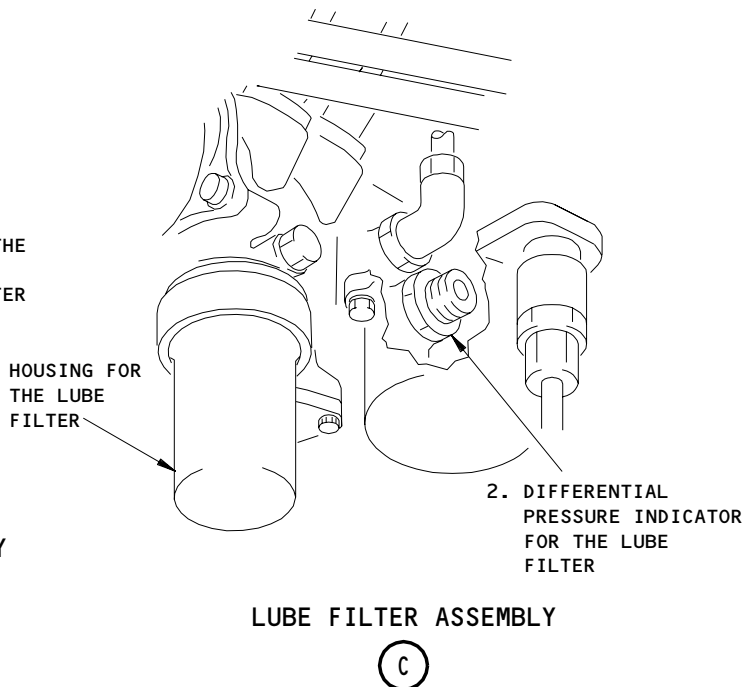
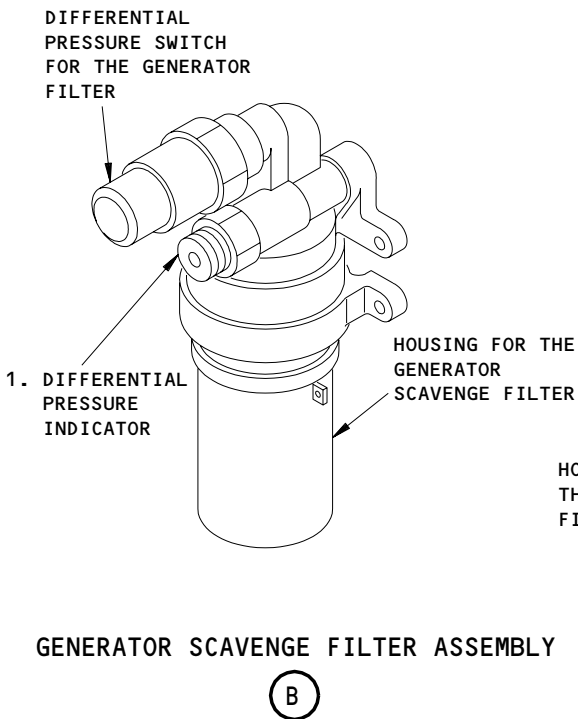
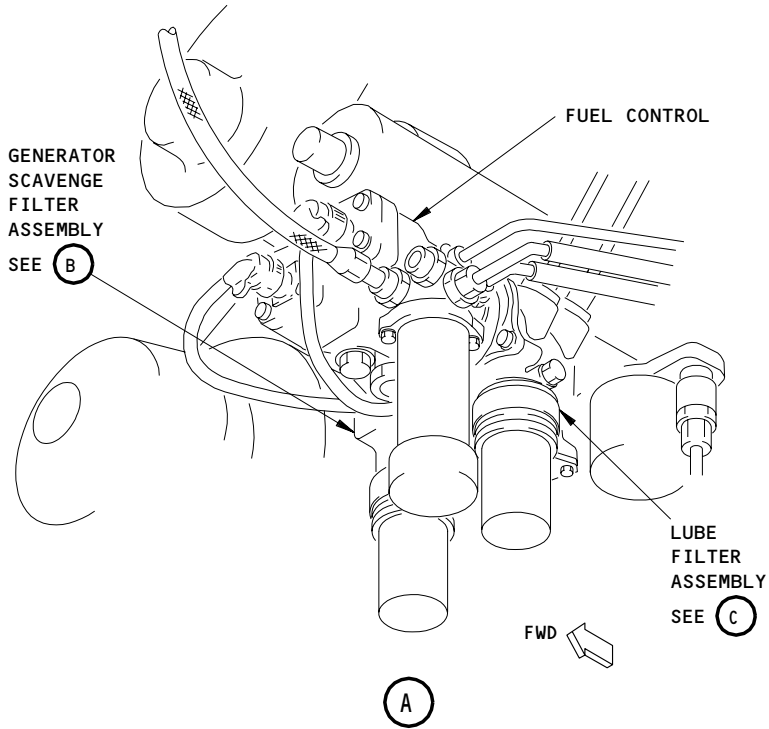
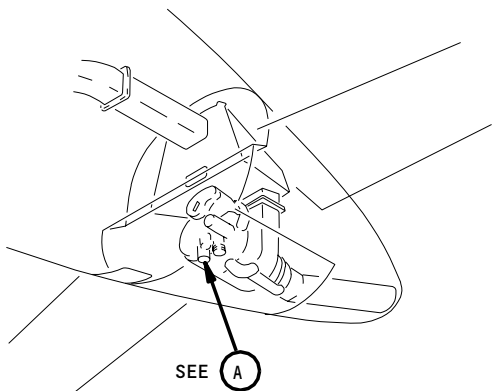
EFFECTIVITY

ALL

49-27-03

03

Page 604  
Aug 22/01



GENERATOR SCAVENGE FILTER ASSEMBLY

LUBE FILTER ASSEMBLY

Lube and Generator Scavenge Filter Elements Inspection  
Figure 601

EFFECTIVITY

ALL

49-27-03

01

Page 605  
Apr 22/01

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- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-022

- (4) Do the visual inspection of the differential pressure indicators:
  - (a) Look at the differential pressure indicator (1) on the generator scavenge filter assembly.
    - 1) If the indicator (1) is pushed out, do an inspection of the filter element for the generator scavenge filter. Do this task: Lube and Generator Scavenge Filter Elements Inspection.

NOTE: This is an indication that the differential pressure is more than the limit and the filter element has blockage.

- 2) If the filter element has blockage, replace it. Do these tasks: Lube and Generator Scavenge Filter Elements Removal and Lube and Generator Scavenge Filter Elements Installation (AMM 49-27-03/401).
- 3) If the filter element does not have blockage, push the differential pressure indicator (1) in to set it.
- 4) If this is a continuous problem with this indicator, replace the differential pressure indicator (1) (AMM 49-27-16/401).
- (b) Look at the differential pressure indicator (2) on the Lube filter assembly.
  - 1) If the indicator (2) is pushed out, do an inspection of the pressure filter element. Do this task: Lube and Generator Scavenge Filter Elements Inspection.
  - 2) If the filter element has blockage, replace it. Do these tasks: Lube and Generator Scavenge Filter Elements Removal and Lube and Generator Scavenge Filter Elements Installation (AMM 49-27-03/401).
  - 3) If the pressure filter element does not have blockage, push the differential pressure indicator (2) in to set it.
  - 4) If this a continuous problem with this indicator, replace the differential pressure indicator (2) (AMM 49-27-07/401).

EFFECTIVITY

ALL

49-27-03

01

Page 606  
Apr 22/01

D. Put the Airplane Back to its Usual Condition

S 416-023

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 866-024

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 866-025

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-27-03

03

Page 607  
Aug 22/01

MAGNETIC CHIP DETECTOR AND DRAIN PLUG – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) Magnetic Chip Detector Removal
  - (2) Magnetic Chip Detector Installation
  - (3) Oil Reservoir Drain Plug Removal
  - (4) Oil Reservoir Drain Plug Installation
- B. You can get access to the magnetic chip detector(s) through the APU access doors.

TASK 49-27-04-004-001

2. Magnetic Chip Detector Removal (Fig. 401)

A. General

- (1) There is a drain plug installed in the bottom of the gearbox. There are also four magnetic chip detectors to catch metal particles in the oil. A chip detector is installed in the drain plug for the gearbox oil. A chip detector is installed in the generator scavenge return port for the generator scavenge oil. The turbine bearing oil has a chip detector installed on the right side of the APU (next to the oil temperature sensor and low oil pressure switch). The compressor bearing oil has a chip detector installed on the scavenge tube to the left of the scavenge oil filter.
- (2) It is not necessary to drain the oil when you examine the chip detectors. The chip detectors have a spring that closes a valve when you remove the detectors.

B. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

C. Procedure

S 864-003

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

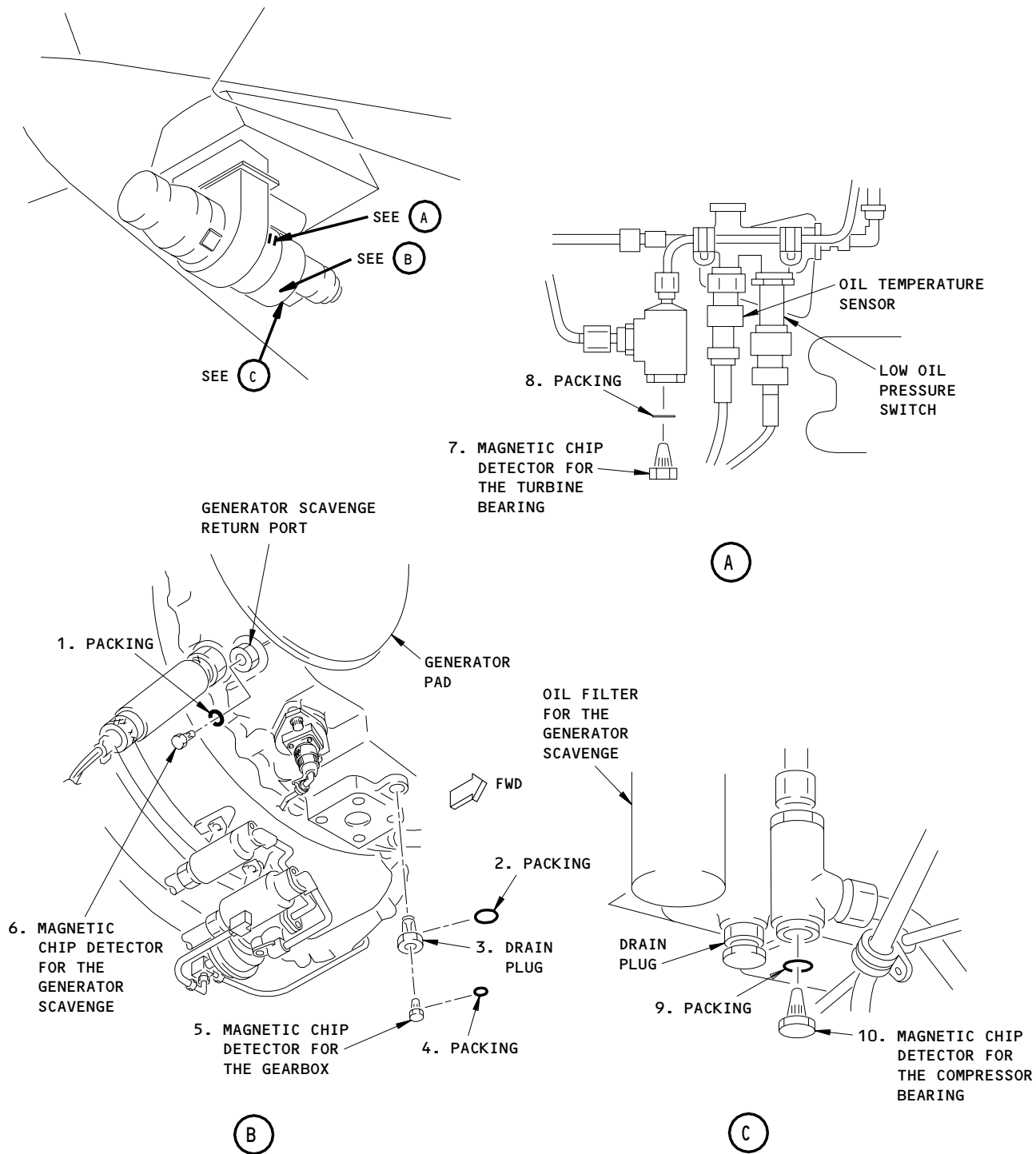
EFFECTIVITY

ALL

49-27-04

07

Page 401  
Aug 22/01



Magnetic Chip Detector and Drain Plug Installation  
Figure 401

EFFECTIVITY	
	ALL

49-27-04

05

Page 402  
Dec 10/98

S 864-004

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 014-006

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-007

- (4) Remove the gearbox chip detector:
- (a) Turn the chip detector counterclockwise to remove it.
  - (b) Remove and discard the packing from the chip detector.

S 024-008

- (5) Remove the chip detector for the generator scavenge oil:
- (a) Turn the chip detector counterclockwise to remove it.
  - (b) Remove and discard the packing from the chip detector.

S 024-010

- (6) Remove the chip detector for the turbine bearing:
- (a) Turn the chip detector counterclockwise to remove it.
  - (b) Remove and discard the packing from the chip detector.

EFFECTIVITY

ALL

49-27-04

08

Page 403  
Aug 22/01



S 024-012

- (7) Remove the chip detector for the compressor bearing:  
 (a) Turn the chip detector counterclockwise to remove it.  
 (b) Remove and discard the packing from the chip detector.

TASK 49-27-04-404-018

3. Magnetic Chip Detector Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or  
 (2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Packing	49-27-04	05	90
	4	Packing			110
	5	Plug Assembly (Gearbox Magnetic Chip Detector)			105
	6	Plug Assembly (Generator Scavenge Magnetic Chip Detector)			85
	7	Plug Assembly (Turbine Bearing Magnetic Chip Detector)			60
	8	Packing			65
	9	Packing			65
	10	Plug Assembly (Compressor Bearing Magnetic Chip Detector)			60

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right  
 211 Flight Compartment - Left  
 212 Flight Compartment - Right  
 315 APU Compartment - Left  
 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left  
 316AR APU Access Door - Right  
 822 Aft Cargo Door

EFFECTIVITY

ALL

49-27-04

04

Page 404  
 Aug 22/05

E. Procedure

S 424-020

- (1) Install the gearbox chip detector:
  - (a) Lubricate the new packing with a light coat of lubricant or oil.
  - (b) Install the packing on the gearbox chip detector.
  - (c) Install the gearbox chip detector in the drain plug.
  - (d) Turn the chip detector clockwise until the lockpins engage.

S 424-021

- (2) Install the chip detector for the generator scavenge:
  - (a) Lubricate the new packing with a light coat of lubricant or oil.
  - (b) Install the packing on the chip detector.
  - (c) Install the chip detector in the plug in the scavenge return port.
  - (d) Turn the chip detector clockwise until the lockpins engage.

S 424-023

- (3) Install the chip detector for the turbine bearing:
  - (a) Lubricate the new packing with a light coat of lubricant or oil.
  - (b) Install the packing on the chip detector.
  - (c) Install the chip detector in the plug adjacent to the oil temperature sensor.
  - (d) Turn the chip detector clockwise until the lockpins engage.

S 424-025

- (4) Install the chip detector for the compressor bearing:
  - (a) Lubricate the new packing with a light coat of lubricant or oil.
  - (b) Install the packing on the chip detector.
  - (c) Install the chip detector in the plug adjacent to the oil filter for the generator scavenge.
  - (d) Turn the chip detector clockwise until the lockpins engage.

S 414-027

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.

EFFECTIVITY

ALL

49-27-04

08

Page 405  
Aug 22/05

(e) Close the four latches on the right access door.

S 864-029

(6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-030

(7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

TASK 49-27-04-004-031

4. Oil Reservoir Drain Plug Removal (Fig. 401)

A. Standard Tools and Equipment

- (1) Container - 2 U.S. Gallon (8 Liter) capacity, for oil

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo door

C. Procedure

S 864-032

(1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-033

(2) Open these circuit breakers and attach DO-NOT-CLOSE tags:

- (a) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT
- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

EFFECTIVITY

ALL

49-27-04

08

Page 406  
Aug 22/05

S 014-035

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-036

- (4) Remove the drain plug for the oil reservoir:

(a) Put the container below the drain plug.

(b) Remove the drain plug from the gearbox.

(c) Remove and discard the packing from the drain plug.

S 684-037

- (5) Let the oil drain from the gearbox to the container.

TASK 49-27-04-404-038

5. Oil Reservoir Drain Plug Installation (Fig. 401)

A. References

(1) AMM 12-13-04/301, APU Servicing

(2) AMM 49-27-00/301, APU and Generator Lubrication System

B. Consumable Materials

(1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

(2) D00341 Lubricant - Santovac 5

EFFECTIVITY

ALL

49-27-04

04

Page 407  
Aug 22/05

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Packing Plug Assembly (Drain Plug)	49-27-04	05	115
	3				105

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-039

- (1) Install the reservoir drain plug:
- (a) Lubricate the new packing with a light coat of lubricant or oil.
  - (b) Install the packing on the drain plug.
  - (c) Install the drain plug in the gearbox.
  - (d) Tighten the drain plug to 25-35 inch-pounds (2.8-4.0 newton-meters).
  - (e) Install a lockwire on the drain plug.

S 614-040

- (2) Do the servicing for the APU oil system (AMM 49-27-00/301).

S 414-041

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.

EFFECTIVITY

ALL

49-27-04

02

Page 408  
Apr 22/09

- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-043

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-044

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-27-04

05

Page 409  
Aug 22/05

MAGNETIC CHIP DETECTOR AND DRAIN PLUG – INSPECTION/CHECK

1. General

- A. This procedure has the task to inspect the magnetic chip detectors.
- B. You can get access to the magnetic chip detectors through the APU access doors.

TASK 49-27-04-206-014

2. Magnetic Chip Detector Inspection (Fig. 601)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-11-01/401, Auxiliary Power Unit
- (3) AMM 49-27-04/401, Magnetic Chip Detector and Drain Plug

B. Equipment

- (1) Compressed Air Source - 30 psig maximum

C. Consumable Materials

- (1) B00074 Solvent - Degreasing, MIL-PRF-680 (Supersedes P-D-680)

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 026-045

- (1) Do this procedure: Magnetic Chip Detector Removal (AMM 49-27-04/401).

S 216-016

- (2) Examine the magnetic chip detector for metal particles.

NOTE: Metal particles on the magnetic chip detector give an indication of internal damage to the engine. If you see metal particles on the magnetic chip detector, examine the engine to find the cause and quantity of damage.

- (a) If the magnetic chip detector is free of metal particles, the APU is satisfactory.
- (b) A small quantity of metal particles that are not silver color are permitted.

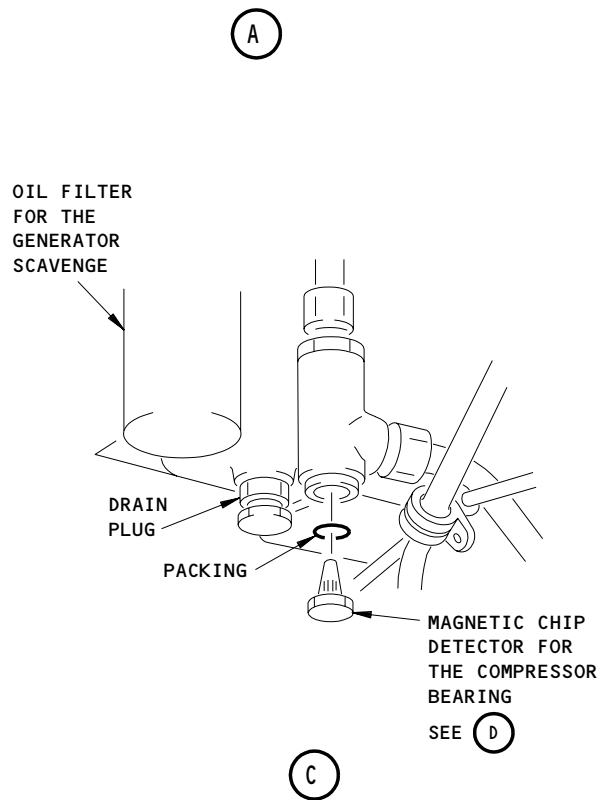
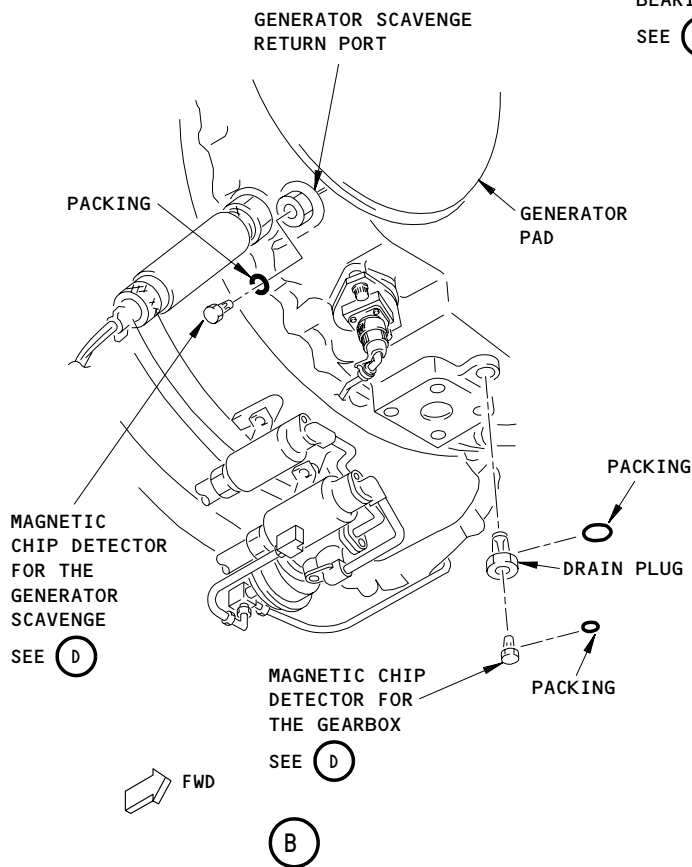
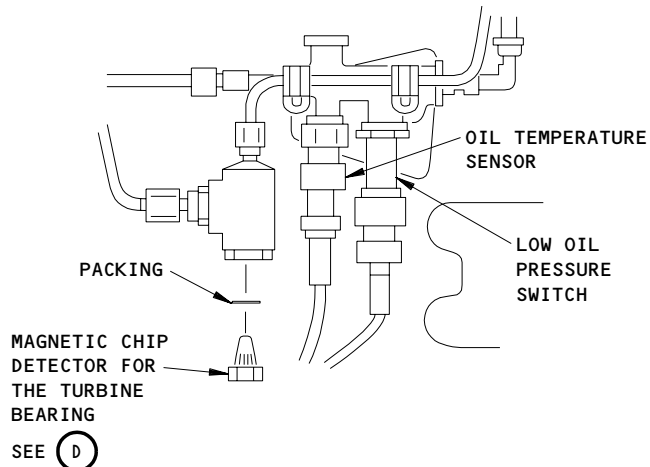
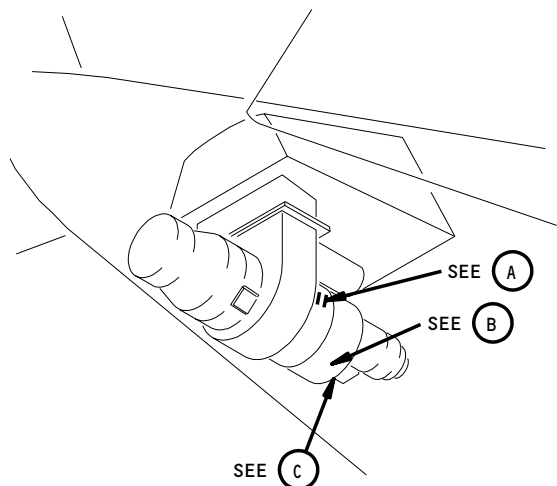
EFFECTIVITY

ALL

49-27-04

01

Page 601  
Dec 22/07

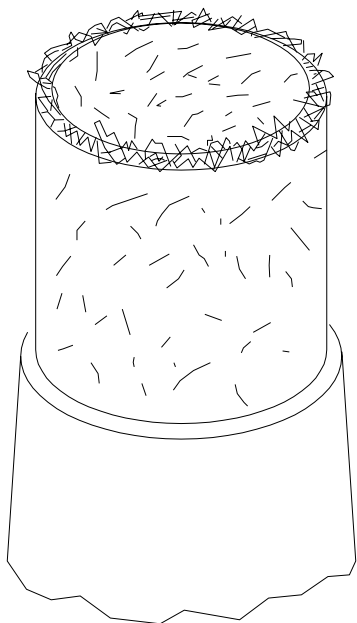


Magnetic Chip Detector and Drain Plug Inspection  
Figure 601 (Sheet 1)

EFFECTIVITY	
	ALL

49-27-04





SMALL QUANTITY OF  
METAL PARTICLES

(D)



MEDIUM QUANTITY OF  
METAL PARTICLES

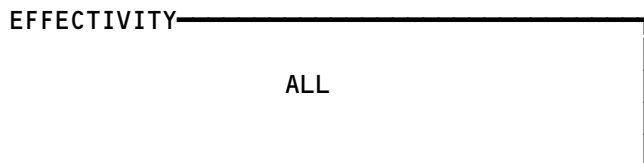
(D)



LARGE QUANTITY OF  
METAL PARTICLES

(D)

Magnetic Chip Detector and Drain Plug Inspection  
Figure 601 (Sheet 2)



49-27-04

02

Page 603  
Aug 22/05

165294

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767  
MAINTENANCE MANUAL

(c) Silver color particles are not permitted.

NOTE: Silver color particles give an indication of damage to the APU.

1) If you find silver color particles, replace the APU (AMM 49-11-01/401).

(d) If you find a medium quantity of metal particles that are not silver color, then do these steps:

WARNING: DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, HEAT, AND FLAME. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- 1) Put the magnetic chip detector in the solvent.
- 2) Dry the magnetic chip detector with the compressed air.
- 3) Do this procedure: Magnetic Chip Detector Installation (AMM 49-27-04/401).
- 4) Do this task: APU Starting and Operation (AMM 49-11-00/201).
- 5) After 15 minutes, do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- 6) Do this task: Magnetic Chip Detector Removal (AMM 49-27-04/401).
- 7) Examine the magnetic chip detector for metal particles.
- 8) More metal particles on the magnetic chip detector are not permitted.
  - a) If you find more metal particles, replace the APU (AMM 49-11-01/401).
- 9) If no more metal particles are found, the APU is satisfactory.

(e) A large quantity of metal particles is not permitted.

NOTE: A large quantity of metal particles give an indication of internal damage to the engine.

1) If you find a large quantity of metal particles, replace the APU (AMM 49-11-01/401).

S 416-017

(3) Do this procedure: Magnetic Chip Detector Installation (AMM 49-27-04/401).

EFFECTIVITY

ALL

49-27-04

01

Page 604  
Aug 22/05

OIL PRESSURE REGULATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the oil pressure regulator.
- B. The fluid pressure valve assembly is referred to as the oil regulator valve.
- C. The oil pressure regulator is a valve on the APU lube pump. The APU lube pump is on the forward bottom end of the APU.
- D. You can get access to the oil pressure regulator through the APU access doors.

TASK 49-27-05-004-001

2. Oil Pressure Regulator Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT- OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

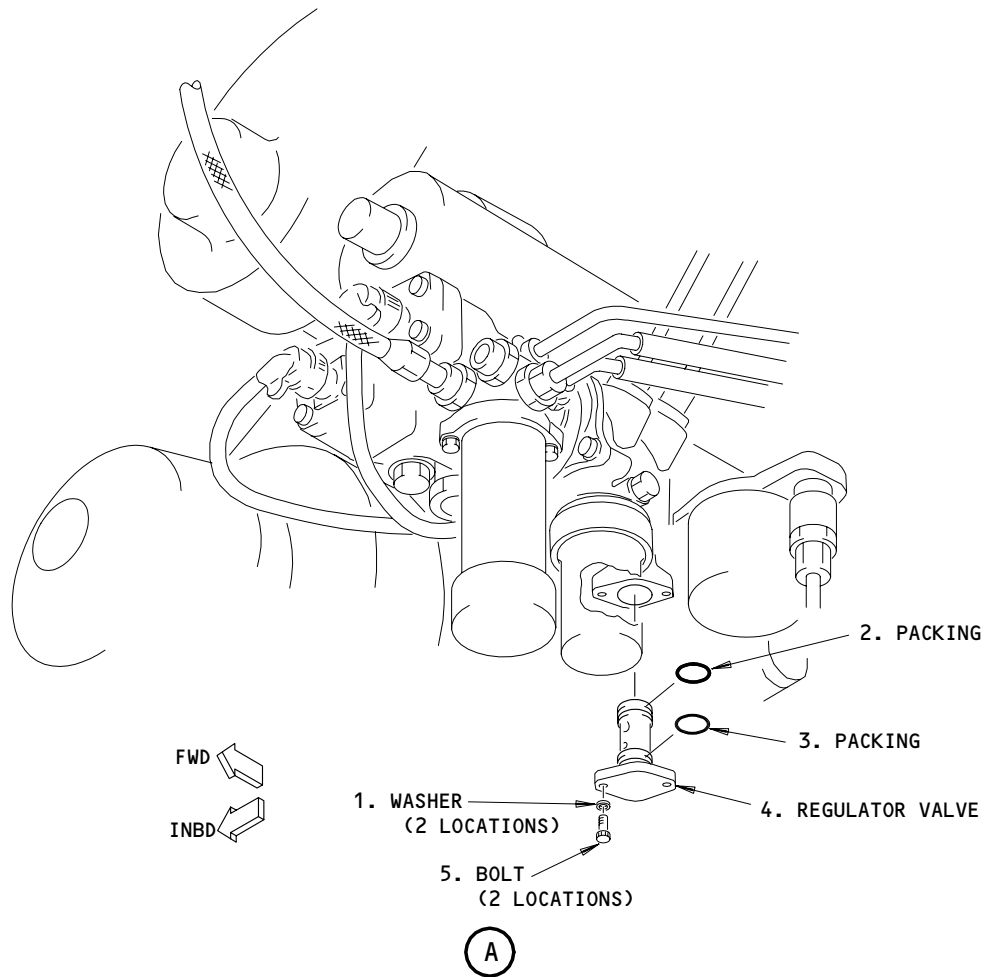
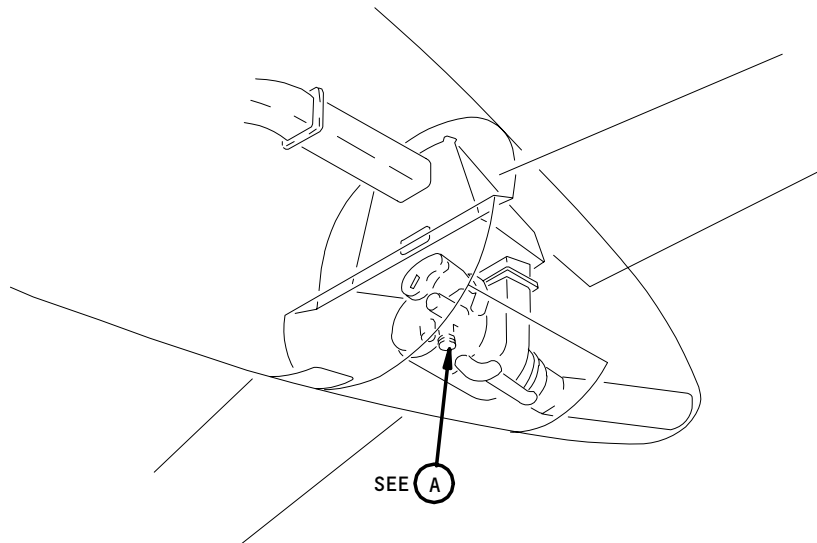
EFFECTIVITY

ALL

49-27-05

01

Page 401  
Dec 22/07



Oil Pressure Regulator Installation  
Figure 401

EFFECTIVITY	
	ALL

49-27-05

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the oil pressure regulator:

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE APU PARTS. OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (a) Remove the bolts (5) and the washers (1) that attach the regulator valve (4) to the lube pump.
- (b) Remove the regulator valve (4) from the lube pump.
- (c) Remove and discard the packings (2 and 3) on the regulator valve (4).

EFFECTIVITY

ALL

49-27-05

03

Page 403  
Dec 22/07

TASK 49-27-05-404-006

3. Oil Pressure Regulator Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Packing	49-27-00	01	182
	3	Packing			163
	4	Fluid Pressure Valve Assembly (Oil Pressure Regulator)			179

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

(1) Install the oil pressure regulator:

- (a) Lubricate the new packings (2 and 3) with a light coat of lubricant or oil.
- (b) Install the packings (2 and 3) on the regulator valve (4).
- (c) Install the regulator valve (4) in the lube pump with the washers (1) and the bolts (5).

EFFECTIVITY

ALL

49-27-05

01

Page 404  
Dec 22/07

(d) Tighten the bolts (5) to 25-30 inch-pounds (2.8-3.4 newton-meters).

S 864-008

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-010

- (4) Examine the installation of the oil pressure regulator for leakage:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the APU lube pump for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-05

03

Page 405  
Dec 22/07

APU GENERATOR SEAL PLATE – REMOVAL/INSTALLATION

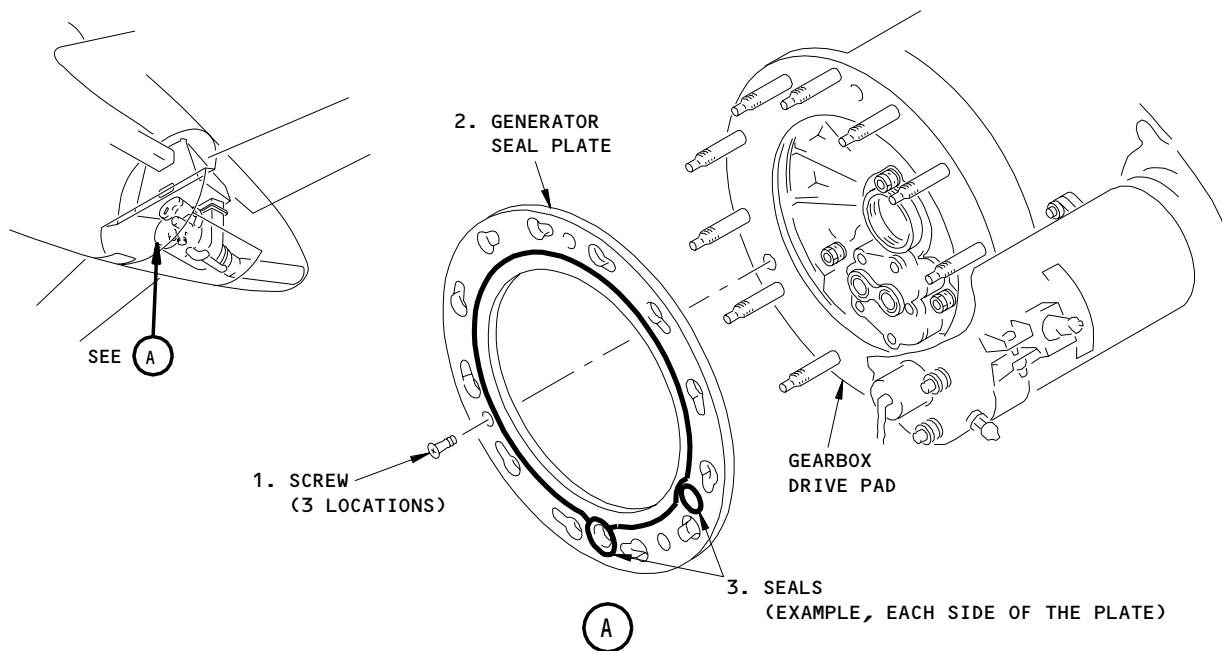
1. General

- A. This procedure has these tasks:
  - (1) A removal of the generator seal plate
  - (2) An installation of the generator seal plate.
- B. The generator seal plate is an aluminum plate made in the shape of a ring. The generator seal plate is installed between the generator mounting flange and the gearbox drive pad. The seal plate gives a tight seal around the oil ports and the outer edge of the ring to prevent leakage.
- C. You must remove the APU generator to get access to the generator seal plate. The APU generator is on the right forward end of the APU. You can get access to the APU generator through the APU access doors.

TASK 49-27-06-004-001

2. Generator Seal Plate Removal (Fig. 401)

- A. References
  - (1) AMM 24-21-01/401, APU Generator



APU Generator Seal Plate Installation  
Figure 401

EFFECTIVITY	
	ALL

**49-27-06**

01

Page 401  
Apr 22/05

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B. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

C. Procedure

S 014-002

- (1) Do this task: APU Generator Removal (AMM 24-21-01/401).

S 024-003

- (2) Remove the generator seal plate:
- (a) Remove the three screws that attach the generator seal plate to the gearbox.
  - (b) Remove the generator seal plate from the gearbox.

TASK 49-27-06-404-004

3. Generator Seal Plate Installation (Fig. 401)

A. References

- (1) AMM 24-21-01/401, APU Generator

B. Consumable Materials

- (1) D00287 Lubricant - Acryloid HF866 or  
D00000 Lubricant - Royco HF825

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Generator Seal Plate	49-11-00	01	305

D. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

E. Procedure

S 424-005

- (1) Install the generator seal plate:
- (a) Make sure the rubber seals on the generator seal plate are tight and do not have damage.
  - (b) Lubricate the rubber seals with the lubricant.
  - (c) Put the generator seal plate in its position on the gearbox drive pad.
  - (d) Install the three screws that attach the generator seal plate to the gearbox.

S 424-011

- (2) Do this task: APU Generator Installation (AMM 24-21-01/401).

EFFECTIVITY

ALL

**49-27-06**

01

Page 402  
Aug 22/05

APU GENERATOR SEAL PLATE - INSPECTION/CHECK

1. General

- A. This procedure has the task to inspect the generator seal plate.
- B. The generator seal plate is an aluminum plate made in the shape of a ring. The generator seal plate is installed between the generator mounting flange and the gearbox drive pad. The seal plate gives a tight seal around the oil ports and the outer edge of the ring to prevent leakage.
- C. You must remove the APU generator to get access to the generator seal plate. The APU generator is on the right forward end of the APU. You can get access to the APU generator through the APU access doors.

TASK 49-27-06-206-007

2. APU Generator Seal Plate Inspection

A. References

- (1) AMM 49-27-06/401, APU Generator Seal Plate

B. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

C. Procedure

S 026-011

- (1) Do this task: Generator Seal Plate Removal (AMM 49-27-06/401).

S 216-009

- (2) Visually examine the generator seal plate:
  - (a) Examine the generator seal plate for cracks and bends.
  - (b) Examine the seals on the two sides of the plate for deterioration and damage.
  - (c) Replace the generator seal plate if you find damage.

S 426-012

- (3) Do this task: Generator Seal Plate Installation (AMM 49-27-06/401).

EFFECTIVITY

ALL

49-27-06

01

Page 601  
Aug 22/05

LUBE FILTER DIFFERENTIAL PRESSURE INDICATOR – REMOVAL/INSTALLATION

1. General

- A. There are two tasks in this procedure. The first task is used to remove the differential pressure indicator for the lube filter. The second task is used to install the differential pressure indicator. This procedure will refer to the differential pressure indicator as the indicator.
- B. The indicator is pushed out when the pressure difference is  $20 \pm 5$  psid across the filter. This is an indication that the filter is blocked.

TASK 49-27-07-004-001

2. Lube Filter Differential Pressure Indicator Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Indicator Removal

S 864-002

- (1) Put the APU control switch in the OFF position and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

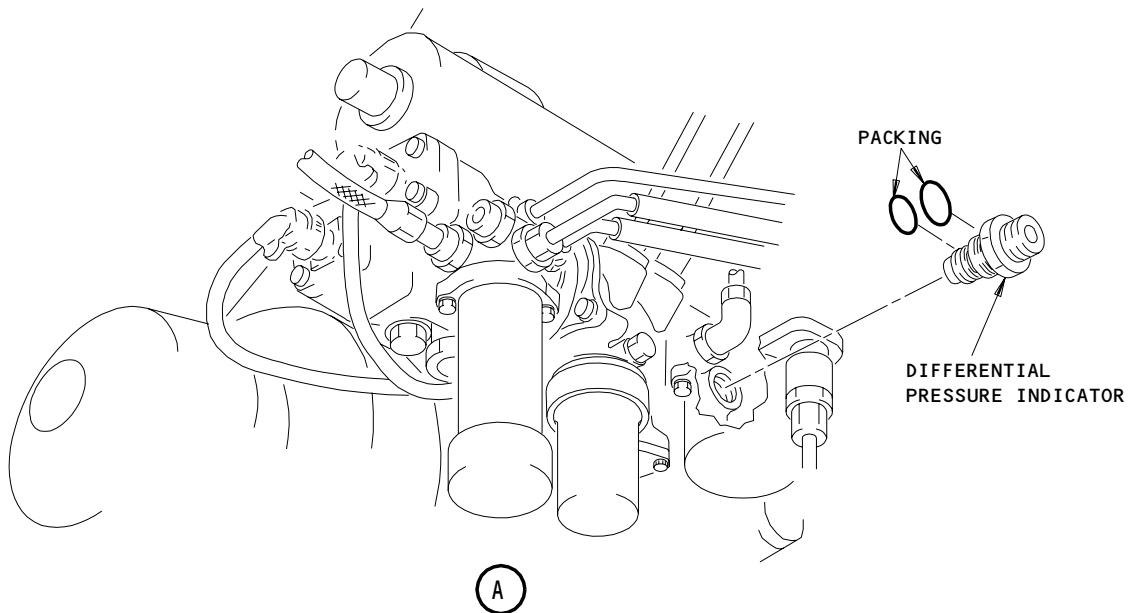
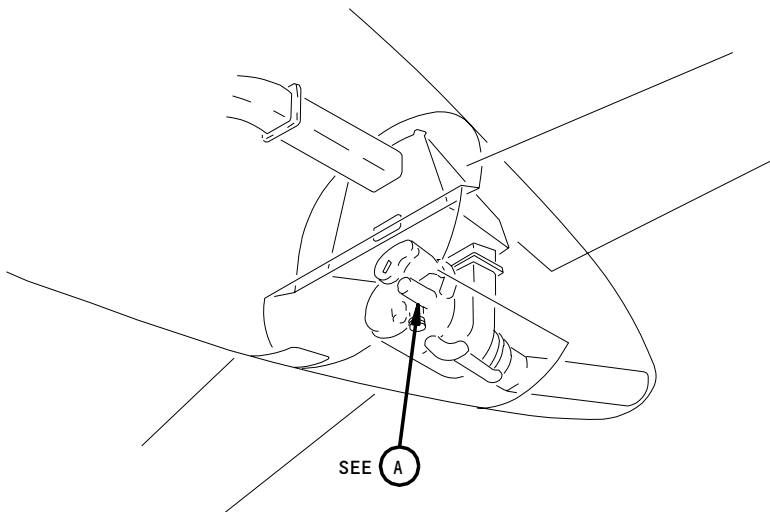
EFFECTIVITY

ALL

49-27-07

05

Page 401  
Apr 22/04



Lube Filter Differential Pressure Indicator Installation  
Figure 401

EFFECTIVITY	
	ALL

49-27-07

2) 49C3, APU START

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-006

WARNING: DO NOT KEEP THE OIL ON YOUR SKIN FOR A LONG TIME. IF YOU DO NOT CLEAN THE OIL OFF YOUR SKIN, THE OIL CAN CAUSE INJURY.

CAUTION: DO NOT LET OIL FLOW ON YOUR CLOTHES OR ON THE GROUND. THE OIL WILL STAIN YOUR CLOTHES AND MAKE PAINT SOFT.

(4) Remove the indicator from the side of the lube pump.

S 034-007

(5) Discard the packings on the indicator.

TASK 49-27-07-404-008

3. Lube Filter Differential Pressure Indicator Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

EFFECTIVITY

ALL

49-27-07

06

Page 403  
Dec 22/03

(2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Differential Pressure Indicator Packing	49-27-00	01	176 177 and 178

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Indicator Installation

S 644-009

- (1) Lubricate the new packings with a light coat of lubricant or oil.

S 424-021

- (2) Install the packings on the indicator.

S 424-011

- (3) Install the indicator on the lube pump.
- (a) Tighten the indicator to 105-115 inch-pounds (11.9-12.9 newton meters).
  - (b) Install a lockwire on the indicator.

S 864-012

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-014

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch.

EFFECTIVITY

ALL

49-27-07

03

Page 404  
Aug 22/05

- S 864-015
- (6) Do this task: APU Starting and Operation (AMM 49-11-00/201).
- S 794-016
- (7) Examine the APU for leakage.
- S 864-017
- (8) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- S 414-018
- (9) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.
- NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-07

01

Page 405  
Aug 22/05

DE-OIL SOLENOID VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the de-oil solenoid valve on the APU.
- B. The de-oil solenoid valve is installed on the face of the APU gearbox. You can get access to the valve through the APU access doors.

TASK 49-27-08-004-001

2. De-Oil Solenoid Valve Removal (Fig. 401)

A. References

- (1) SSM 49-00-02
- (2) WDM 49-14-11

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

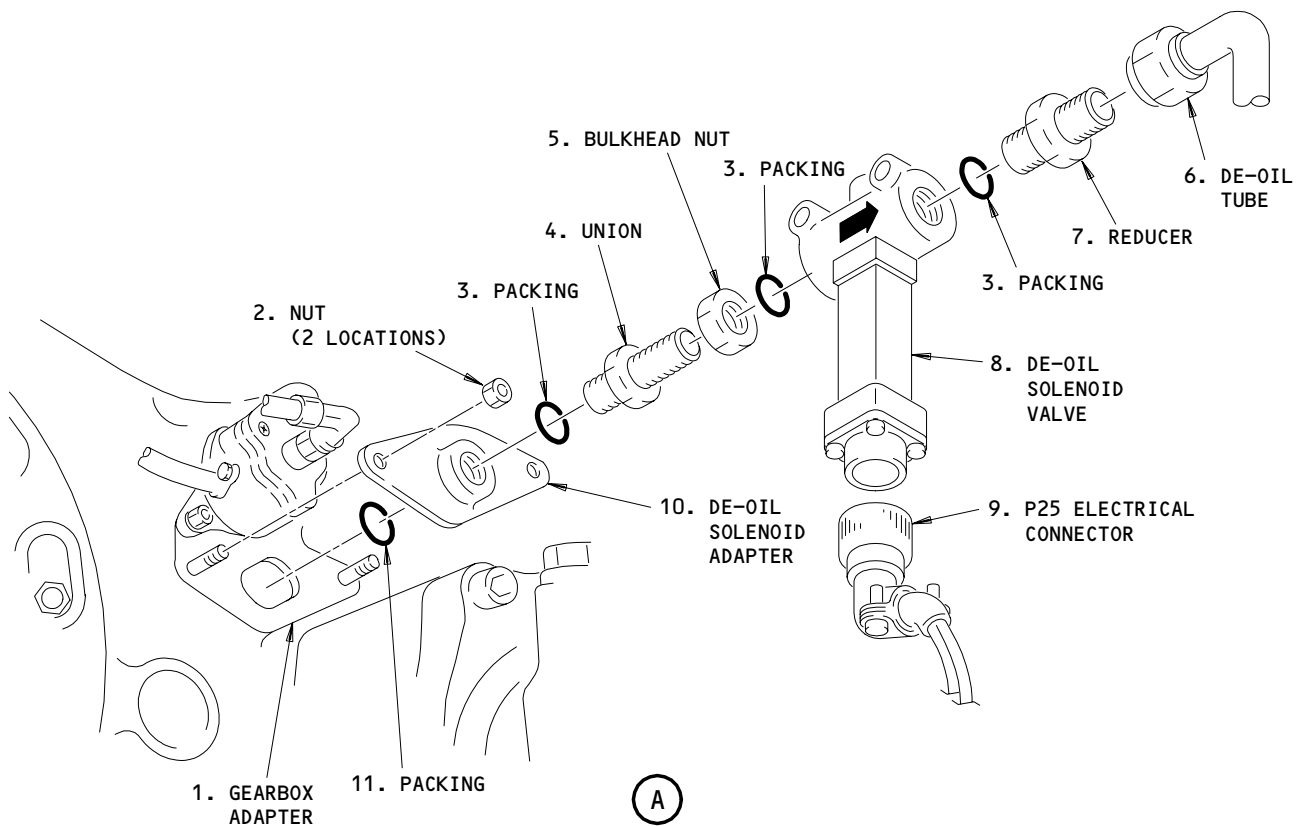
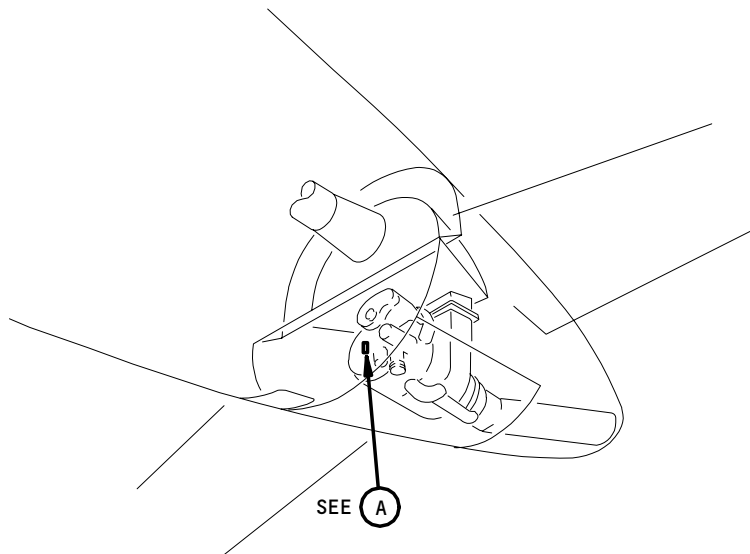
ALL

49-27-08

01

Page 401  
Aug 22/01





De-oil Solenoid Valve Installation  
Figure 401

EFFECTIVITY	
	ALL

49-27-08

03

Page 402  
Aug 10/91

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- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 034-025

- (4) Disconnect the de-oil solenoid valve:

- (a) Disconnect the P25 electrical connector (9) from the de-oil solenoid valve (8).

WARNING: DO NOT LET THE OIL TOUCH YOUR SKIN FOR A LONG TIME. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE AIRPLANE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (b) Disconnect the de-oil tube (6) from the de-oil solenoid valve (8).

EFFECTIVITY

ALL

49-27-08

02

Page 403  
Aug 22/01

S 024-023

- (5) Remove the de-oil solenoid valve:
  - (a) Remove the nuts (2) that attach the de-oil solenoid valve (8) to the gearbox adapter (1).
    - 1) Remove and discard the packing (11) from the gearbox adapter (1).
  - (b) Remove the reducer (7) from the de-oil solenoid valve (8).
    - 1) Remove and discard the packing (3) from the reducer (7).
  - (c) Loosen the bulkhead nut (5) on the union (4).
    - 1) Remove the de-oil solenoid valve (8) from the union (4).
    - 2) Remove the union (4) from the de-oil solenoid adapter (10).
    - 3) Remove and discard the two packings (3) from the union (4).

TASK 49-27-08-404-010

3. De-Oil Solenoid Valve Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-27-14/401, Low Oil Temperature Switch
- (4) AMM 49-61-05/201, APU Control Unit
- (5) SSM 49-00-02
- (6) WDM 49-14-11

B. Equipment

- (1) Series P-500K Gage - Pressure, 0-200 psig, 1/4 inch NPT connection, U.S. Gauge  
900 Clymer Avenue, Sellersville, PA 18960 (or equivalent gage)
- (2) MS9954-07 Plug (Part of De-Oil Modification Kit PN 3876101-2:  
Honeywell SB 49-5438 or commercially available)
- (3) Thermometer, range between -20°F to 100°F (-29°C to 38°C)  
(commercially available)

C. Consumable Materials

- (1) G00034 Cloth, Process Cleaning Absorbent Wiper (Cheesecloth, Gauze) - BMS15-5
- (2) D00508 Fluid, Hydraulic - MIL-H-5606
- (3) G01671 Ice, Dry - BB-C-104
- (4) Packing - S9413-557 (Part of De-Oil Modification Kit PN 3876101-2:  
Honeywell SB 49-5438 or commercially available)
- (5) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (6) D00341 Lubricant - Santovac 5

EFFECTIVITY

ALL

49-27-08

06

Page 404  
Dec 22/02

D. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Packing De-Oil Solenoid Valve	49-27-08	01	75
	8				55

E. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

F. Procedure

S 424-024

- (1) Install the de-oil solenoid valve:
- (a) Lubricate the new packing (3) with a light coat of lubricant or oil.
  - (b) Install the packing (3) and the reducer (7) on the side of the de-oil solenoid valve (8) with the arrow point.
  - (c) Lubricate the new packing (3) with a light coat of lubricant or oil.
  - (d) Install the packing (3) on the end of the union (4) that attaches to the de-oil solenoid adapter (10).
  - (e) Install the union (4) in the de-oil solenoid adapter (10).
  - (f) Lubricate the new packing (3) with a light coat of lubricant or oil.
  - (g) Install the bulkhead nut (5) and the packing (3) on the union (4).
  - (h) Install the union (4) on the de-oil solenoid valve (8).  
1) Do not tighten the bulkhead nut (5) at this time.
  - (i) Lubricate the new packing (11) with a light coat of lubricant or oil.
  - (j) Install the packing (11) in the gearbox adapter (1).
  - (k) Attach the de-oil solenoid adapter (10) and the de-oil solenoid valve (8) to the gearbox with the nuts (2).  
1) Tighten the nuts (2) to 50-55 inch-pounds (5.7-6.2 newton-meters).

EFFECTIVITY

ALL

49-27-08

04

Page 405  
Aug 22/05

(L) Tighten the bulkhead nut (5) against the de-oil solenoid valve (8).

S 434-013

- (2) Connect the de-oil solenoid valve:  
(a) Connect the de-oil tube (6) to the de-oil solenoid valve (8).

S 864-015

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:  
(a) P49 APU Auxiliary Panel  
    1) 49C2, APU PRIME CONT  
    2) 49C3, APU START  
(b) P11 Overhead Panel  
    1) 11B35, APU ALTN CONT

S 744-017

- (4) Do the self test for the APU system (AMM 49-61-05/201).

S 794-026

- (5) Do a leakage check for the installation of the de-oil solenoid valve:  
(a) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.  
(b) Do this task: APU Starting and Operation (AMM 49-11-00/201).  
(c) During the APU operation, examine the APU for leakage.  
(d) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).  
(e) If you found leakage, repair the cause of it.

S 714-036

- (6) Do a performance check of the de-oil solenoid valve:  
(a) If the temperature is less than 21°F (-6°C), do the BITE test for the APU system (AMM 49-61-05/201).

NOTE: If the temperature is sufficiently cold, the de-oil solenoid valve operated when the APU started. If the BITE test shows no problems, then the valve operated correctly. If the temperature is not sufficiently cold (more than 21°F (-6°C)), you must do a ground test or do an inflight check of the de-oil solenoid valve.

- (b) If it is necessary, close the left APU access door, 315AL, and right APU access door, 316AR:  
    1) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- 2) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

EFFECTIVITY

ALL

49-27-08

05

Page 406  
Aug 22/02

- 3) Lift the left access door until the two APU access doors are approximately aligned.
  - 4) Close the two APU access doors.
  - 5) Close the four latches on the right access door.
- (c) If the temperature is more than 21°F (-6°C), you must do a ground test or do an inflight check of the de-oil solenoid valve:
- 1) Do these steps for a ground test of the de-oil solenoid valve (recommended method):
    - a) Remove the plug from the test port for the lube pump (oil pressure test port).
    - b) Connect the pressure gage to the oil pressure test port.

**NOTE:** Make sure you can get access to the pressure indications during the APU starting and operation.

- c) Do this task: Low Oil Temperature Switch Removal (AMM 49-27-14/401).
- d) Lubricate the new packing (PN S9413-557) with a light coat of lubricant or oil.
- e) Install the packing on the plug (PN MS9954-07).
- f) Install the plug in the port on the bottom of the APU gearbox.

**NOTE:** The low oil temperature switch was removed from the port on the bottom of the APU gearbox.

- g) Remove the caps from the low oil temperature switch and electrical connector P25.
- h) Connect the electrical connector P25 to the low oil temperature switch.
- i) Put the dry ice, hydraulic fluid and thermometer in an insulated container with insulated gloves.

EFFECTIVITY

ALL

49-27-08

06

Page 407  
Aug 22/02

 **BOEING**  
767  
MAINTENANCE MANUAL

- j) Make sure the temperature in the dry ice and hydraulic fluid solution is less than 21°F (-6°C).
- k) With insulated gloves, put the tip end of the low oil temperature switch in the insulated container with the dry ice and hydraulic fluid solution for a minimum of five minutes.
- l) Make sure the electrical end of the low oil temperature switch and electrical connector P25 do not touch the dry ice and hydraulic fluid solution.
- m) A minimum of three persons is necessary to do the ground test of the de-oil solenoid valve. (1) One person holds the insulated container with the low oil temperature switch, thermometer, and dry ice and hydraulic fluid solution. (2) One person monitors the pressure gage at the start of the APU starting procedure. (3) One person is in the flight compartment for the APU starting procedure.
- n) Do this task: APU Starting and Operation (AMM 49-11-00/201).

NOTE: At the start of the APU starting procedure, make sure you monitor the pressure gage at the oil pressure test port. The oil pressure should be approximately zero during the initial start of the APU, increases slowly or no oil pressure during the APU starting until starter motor cutout at 50% engine speed and increases quickly after the starter motor cutout to 100% speed. The de-oiling system operates correctly when these oil pressure indications occur and the de-oil solenoid valve closes at the starter motor cutout.

- o) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- p) Remove the low oil temperature switch from the insulated container and clean with a cloth.
- q) Remove the plug and packing from the port on the bottom of the APU gearbox and discard packing.
- r) Do this task: Low Oil Temperature Switch Installation (AMM 49-27-14/401).
- s) Remove the pressure gage from the oil pressure test port and install the plug.
- t) Do this task: APU Control Unit - BITE Test (AMM 49-61-05/201).
- u) Make sure there are no problems related to the de-oil solenoid valve.

EFFECTIVITY

ALL

49-27-08

06

Page 408  
Aug 22/02

 **BOEING**  
767  
MAINTENANCE MANUAL

- 2) Do these steps for an inflight check of the de-oil solenoid valve (alternative method):
  - a) After the airplane has been at an altitude of 30,000 feet or higher for one hour or more, do this task: APU Starting and Operation (AMM 49-11-00/201).
  - b) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - c) Do the APU BITE test (AMM 49-61-05/201) on the ground. Make sure that there are no problems related to the de-oil solenoid valve.

EFFECTIVITY

ALL

**49-27-08**

05

Page 409  
Aug 22/02



OIL COOLER - REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:  
(1) A removal of the oil cooler  
(2) An installation of the oil cooler.

TASK 49-27-09-004-001

2. Remove the Oil Cooler (Fig. 401)

A. References

- (1) AMM 49-27-10/401, Oil Cooler Bypass Valve

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Prepare to Remove the Oil Cooler.

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:  
(a) P11 Overhead Panel  
1) 11B35, APU ALTN CONT  
(b) P49 APU Auxiliary Panel  
1) 49C2, APU PRIME CONT

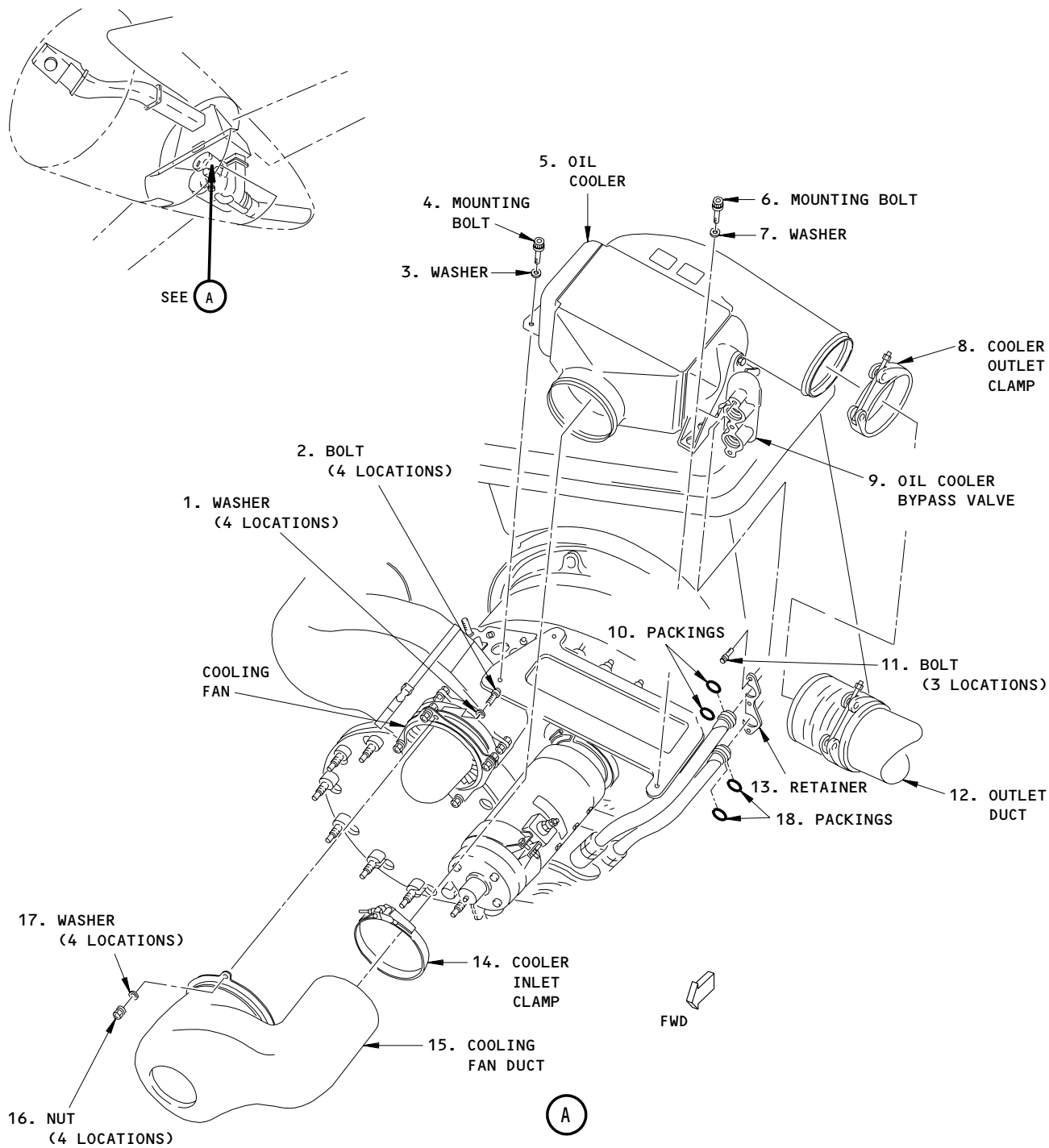
EFFECTIVITY

ALL

**49-27-09**

03

Page 401  
Aug 22/01



Oil Cooler Installation  
Figure 401

EFFECTIVITY

ALL

49-27-09

01

Page 402  
Apr 22/08

10122

2) 49C3, APU START

S 014-044

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

D. Remove the Oil Cooler

S 024-045

- (1) Do these steps to remove the inlet and the outlet ducts from the oil cooler:

(a) Loosen the cooler inlet clamp.

(b) Remove the nuts, the washers, and the bolts that attach the cooling fan duct to the cooling fan.

(c) Move the cooling fan duct and the cooler inlet clamp away from the oil cooler.

(d) Loosen the cooler outlet clamp.

(e) Move the cooler outlet clamp and the outlet duct away from the oil cooler.

S 024-046

- (2) Remove the bolts, retainer, and packings to disconnect the oil tubes from the bypass valve.

(a) Discard the packings.

S 024-008

- (3) Remove the mounting bolts and washers to remove the oil cooler.

EFFECTIVITY

ALL

49-27-09

02

Page 403  
Aug 22/01

S 024-047

- (4) If you will install a new oil cooler, remove the oil cooler bypass valve (AMM 49-27-10/401).  
 (a) Keep the oil cooler bypass valve for installation on the new oil cooler.

S 214-010

- (5) If you will install the same oil cooler, do the oil cooler inspection (AMM 49-27-09/601).

TASK 49-27-09-404-011

3. Install the Oil Cooler (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU-Servicing (Fill the Oil)  
 (2) AMM 49-11-00/201, Auxiliary Power Unit  
 (3) AMM 49-27-10/401, Oil Cooler Bypass Valve

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or  
 (2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	5	Oil Cooler	49-27-00	01	295
401	10	Packing (oil pressure)	49-27-00	01	240
401	18	Packing (oil return)	49-27-00	01	230

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right  
 211 Flight Compartment - Left  
 212 Flight Compartment - Right  
 315 APU Compartment - Left  
 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left  
 316AR APU Access Door - Right  
 822 Aft Cargo Door

E. Procedure

S 424-048

- (1) If the oil cooler bypass valve was removed, install it to the oil cooler (AMM 49-27-10/401).

EFFECTIVITY

ALL

49-27-09

02

Page 404  
Apr 22/08

- S 424-013
- (2) Attach the oil cooler to the bracket with the mounting bolts and washers.
- (a) Tighten the mounting bolts to 50-55 inch-pounds (5.65-6.21 newton meters).
- S 644-054
- (3) Lubricate the new packings with a light coat of lubricant or oil.
- S 424-049
- (4) Install the packings on the oil tubes.
- S 424-050
- (5) Connect the oil lines to the bypass valve with the nuts and the bolts.
- S 424-051
- (6) Attach the outlet duct and the cooler outlet clamp to the oil cooler.
- (a) Tighten the cooler outlet clamp to 25-30 inch-pounds (2.82-3.39 newton meters).
- S 424-052
- (7) Attach the cooling fan duct to the oil cooler with the washers, the nuts, the bolts, and the cooler inlet clamp.
- (a) Tighten the cooler inlet clamp to 25-30 inch-pounds (2.82-3.39 newton meters).
- (b) Tighten the nut to 40-50 inch-pounds (4.52-5.65 newton meters).
- F. Put the Airplane Back to its Usual Condition.
- S 864-018
- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
- 1) 49C2, APU PRIME CONT
- 2) 49C3, APU START
- (b) P11 Overhead Panel
- 1) 11B35, APU ALTN CONT
- S 864-020
- (2) Remove the DO-NOT-OPERATE tag from the APU control switch.
- S 614-021
- (3) Do the procedure to fill the oil (AMM 12-13-04/301).
- S 864-022
- (4) Do this task: APU Starting and Operation (AMM 49-11-00/201).
- S 794-023
- (5) Examine the APU for leakage.

EFFECTIVITY

ALL

49-27-09

04

Page 405  
Aug 22/05

- S 864-024
- (6) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- S 614-025
- (7) Make sure the APU oil level is full (AMM 12-13-04/301).
- S 414-053
- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.
- NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-09

02

Page 406  
Aug 22/02

OIL COOLER - INSPECTION/CHECK

1. General

- A. This procedure contains this task:  
(1) A inspection check of the oil cooler.

TASK 49-27-09-216-027

2. Oil Cooler - Inspection Check

A. General

- (1) You can do this inspection with the oil cooler installed or removed from the APU.  
(2) If it is necessary to clean the oil cooler, you must remove the oil cooler from the APU.

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

- C. If the oil cooler is installed on the APU, do these steps to prepare for the oil cooler inspection:

S 866-028

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-CLOSE tag.

S 866-029

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:  
(a) P11 Overhead Panel  
1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-27-09

01

Page 601  
Apr 22/04

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 016-031

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 036-032

- (4) Do these steps to remove the inlet and the outlet ducts from the oil cooler:

- (a) Loosen the cooler inlet clamp.
- (b) Remove the nuts, the washers, and the bolts that attach the cooling fan duct to the cooling fan.
- (c) Remove the cooling fan duct with the cooler inlet clamp.
- (d) Loosen the cooler outlet clamp.
- (e) Move the outlet duct and the clamp away from the oil cooler.

#### D. Oil Cooler Inspection

S 216-044

- (1) Visually examine the air ducts in the oil cooler for contamination.
  - (a) If you find contamination, do this task: Oil Cooler Cleaning (AMM 49-27-09/701).

S 216-045

- (2) Examine the internal and the external sides of the oil cooler for cracks, for dents, for holes, and for defective welds.
  - (a) If it is necessary, replace the oil cooler.

EFFECTIVITY

ALL

49-27-09

03

Page 602  
Aug 22/01



S 426-046

(3) Do this task: Oil Cooler Installation (AMM 49-27-09/401).

NOTE: If the oil cooler was not removed from the APU, all of the steps to install the APU oil cooler are not necessary.

EFFECTIVITY

ALL

49-27-09

01

Page 603  
Apr 22/09

OIL COOLER – CLEANING

1. General

- A. This procedure contains a task which cleans the air paths of the oil cooler.
- B. The oil cooler must be removed to do this task. You can get access to the APU oil cooler through the APU access doors.

TASK 49-27-09-107-012

2. Oil Cooler – Cleaning/Painting

- A. General
  - (1) It is necessary to remove the oil cooler from the APU to clean the oil cooler.
- B. Consumable Materials
  - (1) B00074 Solvent – Degreasing, MIL-PRF-680 (Supersedes P-D-680)
- C. Clean the Oil Cooler.

S 027-006

- (1) Do this task: Oil Cooler Removal (AMM 49-27-09/401).

S 867-011

- (2) Put protection caps on the two oil ports.

S 167-013

**WARNING:** USE SAFETY GOGGLES WHEN YOU USE THE COMPRESSED AIR. IF YOU DO NOT USE SAFETY GOGGLES, AN EYE INJURY CAN OCCUR.

- (3) Use compressed air at 20 to 30 psig to remove loose contamination from the air ducts of the oil cooler.

S 117-015

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, HEAT, AND FLAME. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (4) Use solvent in a spray booth to clean the air ducts of the oil cooler.

S 167-009

- (5) Use dry, compressed air at 20 to 30 psig to dry the air ducts of the oil cooler.

S 217-010

- (6) Use a strong light to visually examine the oil cooler for remaining contamination.

EFFECTIVITY

ALL

49-27-09

02

Page 701  
Dec 22/07

OIL COOLER BYPASS VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the bypass valve for the APU oil cooler.
- B. The bypass valve for the oil cooler is on the oil cooler. The APU oil cooler is on the forward left side of the APU, above the starter motor.
- C. You can get access to the bypass valve for the oil cooler through the APU access doors.

TASK 49-27-10-004-001

2. Oil Cooler Bypass Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

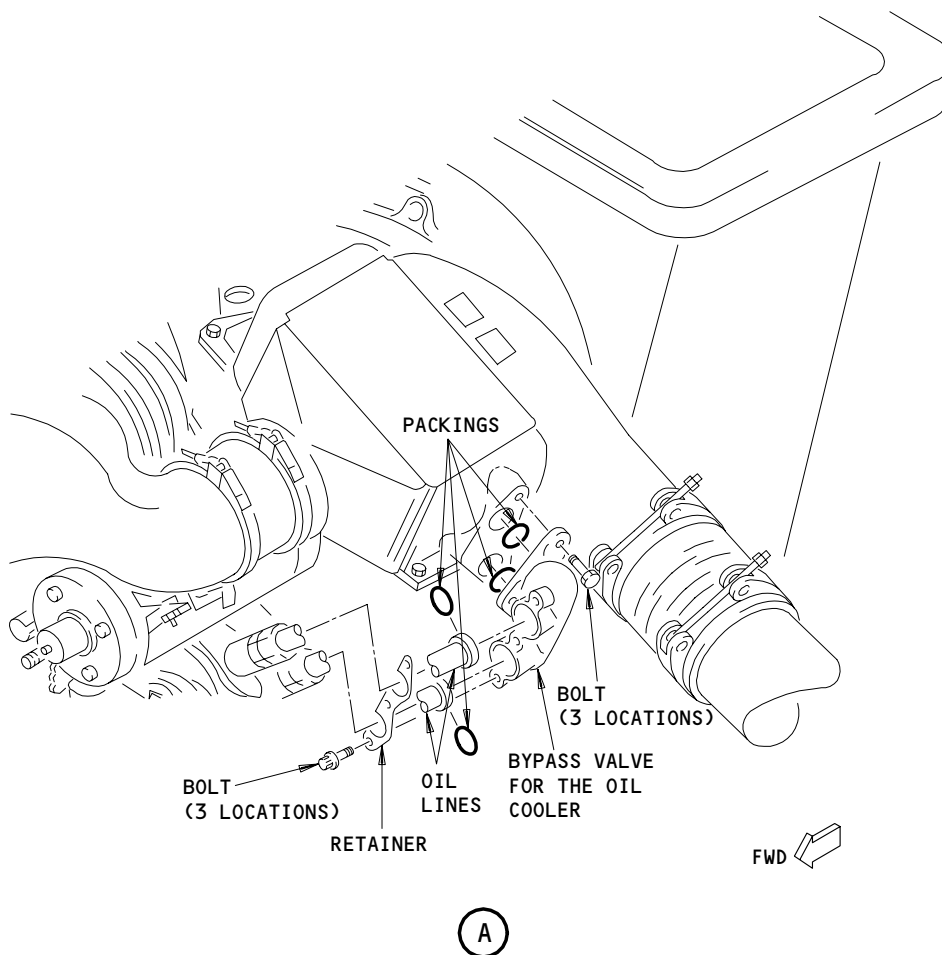
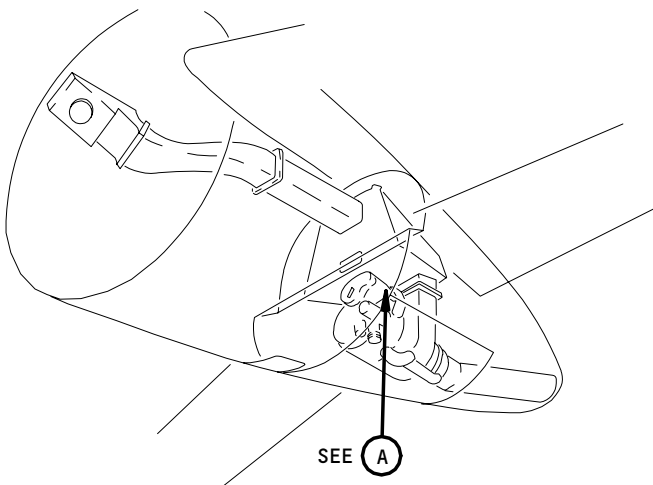
EFFECTIVITY

ALL

49-27-10

03

Page 401  
Aug 22/01



Oil Cooler Bypass Valve Installation  
Figure 401

EFFECTIVITY	
	ALL

49-27-10

01

Page 402  
May 10/91

2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the bypass valve for the oil cooler:

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

CAUTION: IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE APU PARTS. OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

(a) Remove the bolts and the retainer that attach the oil lines to the bypass valve.

(b) Remove the oil lines and the packings from the bypass valve.  
1) Discard the packings.

(c) Remove the three bolts that attach the bypass valve to the oil cooler.

(d) Remove the bypass valve and the packings from the oil cooler.  
1) Discard the packings.

EFFECTIVITY

ALL

49-27-10

03

Page 403  
Aug 22/01

TASK 49-27-10-404-006

3. Oil Cooler Bypass Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Oil Cooler Bypass Valve Packing	49-27-00	01	280 240, 288 and 290

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the bypass valve for the oil cooler:
  - (a) Lubricate the new packings with a light coat of lubricant or oil.
  - (b) Install the packings in the base of the bypass valve.
  - (c) Install the bypass valve on the oil cooler with the three bolts.
    - 1) Tighten the bolts to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (d) Lubricate the new packings for the oil lines with a light coat of lubricant or oil.
  - (e) Install the packings and the oil lines in the bypass valve.

EFFECTIVITY

ALL

49-27-10

03

Page 404  
Dec 22/07

- (f) Install the retainer and the bolts that attach the oil lines to the bypass valve.
  - 1) Tighten the bolts to 50-55 inch-pounds (5.7-6.2 newton-meters).

S 864-008

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-010

- (4) Examine the bypass valve installation for oil leakage:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the bypass valve for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-10

09

Page 405  
Dec 22/07

GEARBOX SHUTOFF VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the gearbox shutoff valve for the APU.
- B. The gearbox shutoff valve is on the right side of the APU inlet plenum. You can get access to the shutoff valve through the APU access doors.

TASK 49-27-11-004-001

2. Gearbox Shutoff Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

EFFECTIVITY

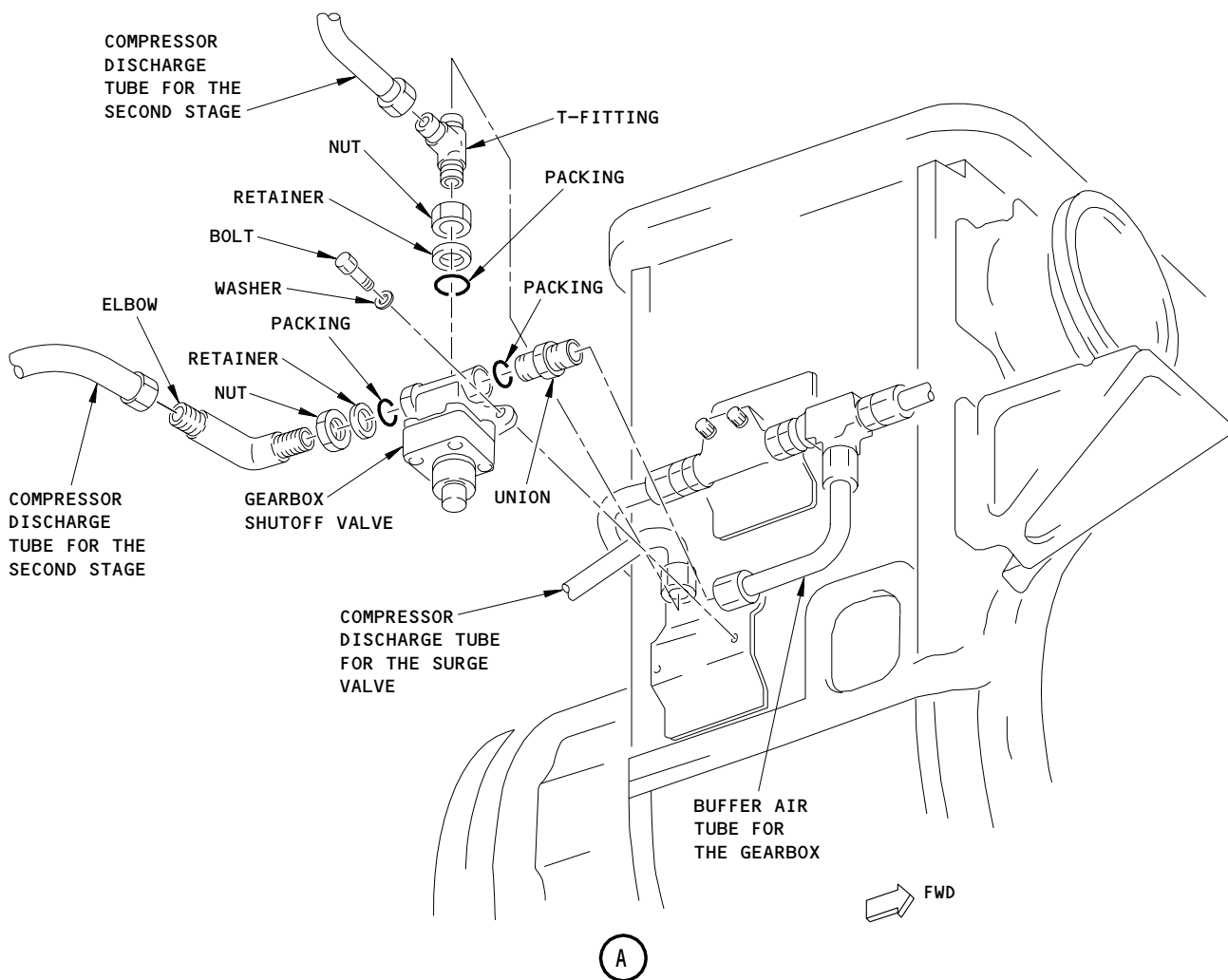
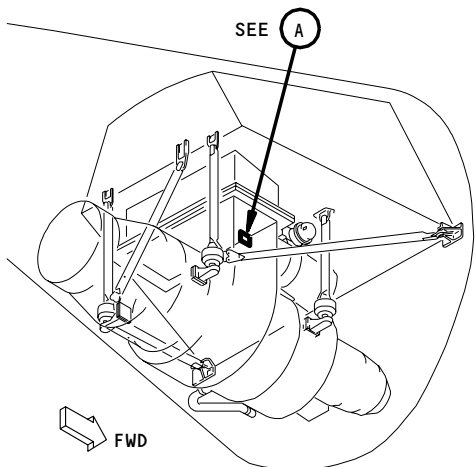
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49-27-11

03

Page 401  
Aug 22/01

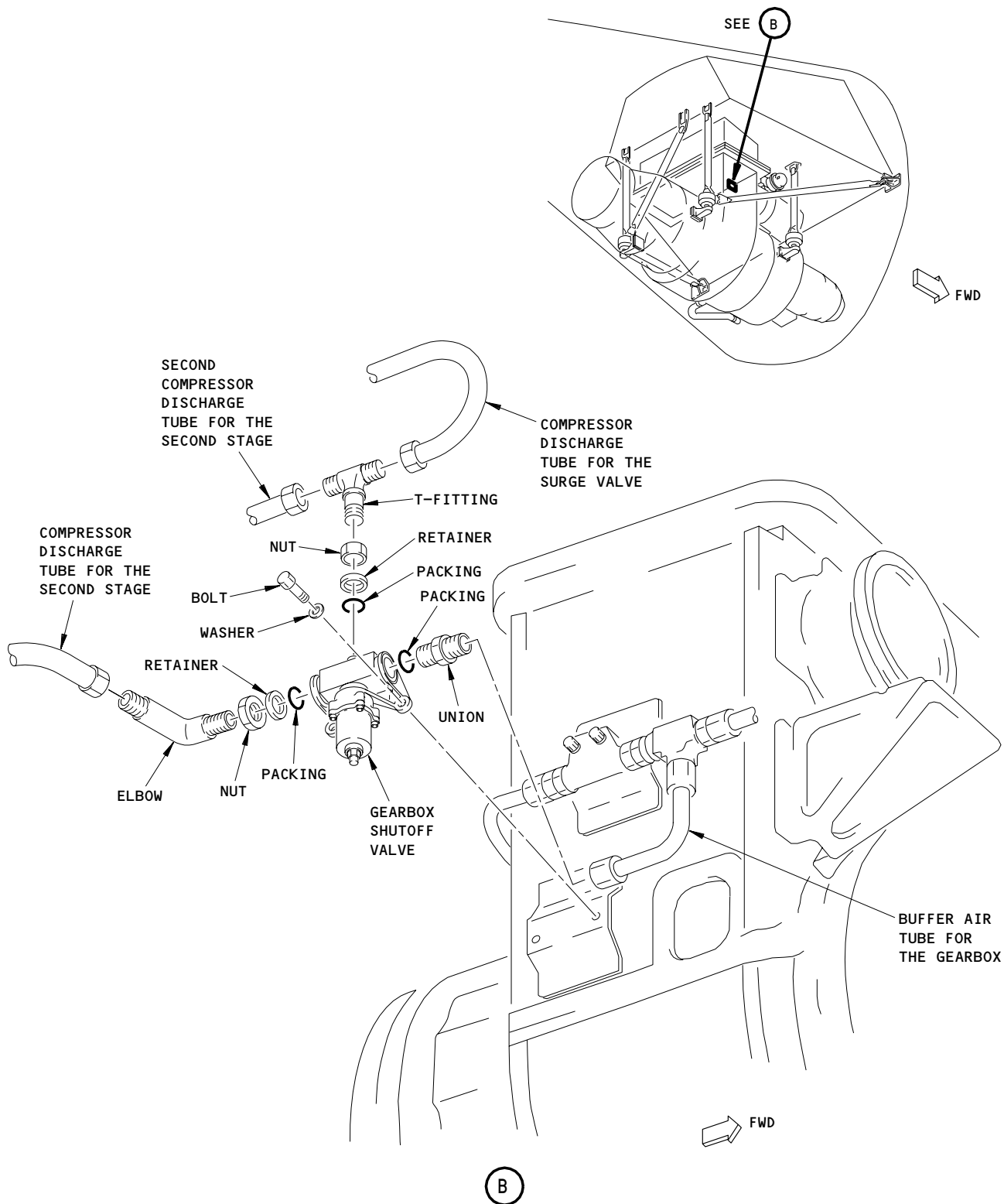




Gearbox Shutoff Valve Installation  
Figure 401 (Sheet 1)

EFFECTIVITY  
APU WITH THE FAN ISOLATION VALVE  
CONNECTED TO THE SURGE VALVE

49-27-11



Gearbox Shutoff Valve Installation  
Figure 401 (Sheet 2)

EFFECTIVITY  
APU WITH THE FAN ISOLATION VALVE  
CONNECTED TO THE FIRST STAGE COMPRESSOR

49-27-11

01

Page 403  
Aug 22/99

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the gearbox shutoff valve:

(a) Disconnect the compressor discharge tube from the elbow.

(b) Remove the elbow, the nut, the retainer, and the packing from the gearbox shutoff valve.

1) Discard the retainer and the packing.

(c) Disconnect the compressor discharge tube for the surge valve from the gearbox shutoff valve.

(d) Remove the T-fitting from the gearbox shutoff valve:

1) Disconnect the second discharge tube from the T-fitting.

2) Remove the T-fitting, the nut, the retainer, and the packing from the gearbox shutoff valve.

3) Discard the retainer and the packing.

(e) Disconnect the buffer air tube for the gearbox from the union.

(f) Remove the union and the packing from the gearbox shutoff valve.

1) Discard the packing.

(g) Remove the bolts and the washers that attach the gearbox shutoff valve to the inlet plenum.

(h) Remove the gearbox shutoff valve.

EFFECTIVITY

ALL

49-27-11

03

Page 404  
Aug 22/01

TASK 49-27-11-404-006

3. Gearbox Shutoff Valve Installation (Fig. 401)

A. References

(1) AMM 12-13-04/301, APU Servicing

B. Consumable Materials

(1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

(2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Gearbox Shutoff Valve Packing	49-27-11 49-53-00	01 01	50 580

D. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

E. Procedure

S 424-007

(1) Install the gearbox shutoff valve:

- (a) Install the gearbox shutoff valve on the inlet plenum with the washers and the bolts.
  - 1) Tighten the bolts to 50 inch-pounds (5.7 newton-meters).
- (b) Lubricate the new packing with a light coat of lubricant or oil.
- (c) Install the union with the packing on the gearbox shutoff valve.
- (d) Connect the buffer air tube for the gearbox to the union.
- (e) Install the T-fitting on the gearbox shutoff valve:
  - 1) Lubricate the new packing with a light coat of lubricant or oil.
  - 2) Install the T-fitting, the nut, a new retainer, and the packing on the gearbox shutoff valve.
  - 3) Connect the compressor discharge tube to the T-fitting.

EFFECTIVITY

ALL

49-27-11

03

Page 405  
Aug 22/05

- (f) Connect the compressor discharge tube for the surge valve to the gearbox shutoff valve.
- (g) Lubricate the new packing with a light coat of lubricant or oil.
- (h) Install the elbow, the nut, a new retainer, and the packing on the gearbox shutoff valve.
- (i) Connect the compressor discharge tube to the elbow.

S 414-008

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-013

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 714-014

- (5) Do an inflight check of the gearbox shutoff valve:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201) in flight at an altitude of 31,000 feet or higher.
  - (b) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (c) Do the APU BITE test (AMM 49-61-05/201) on the ground. Make sure that there are no problems related to the gearbox shutoff valve.

EFFECTIVITY

ALL

49-27-11

06

Page 406  
Aug 22/05

GEARBOX PRESSURE REGULATOR VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the pressure regulator valve for the gearbox.
- B. The pressure regulator valve for the gearbox is on the gearbox adjacent to the generator mounting pad. You can get access to the valve through the APU access doors.

TASK 49-27-12-004-001

2. Gearbox Pressure Regulator Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

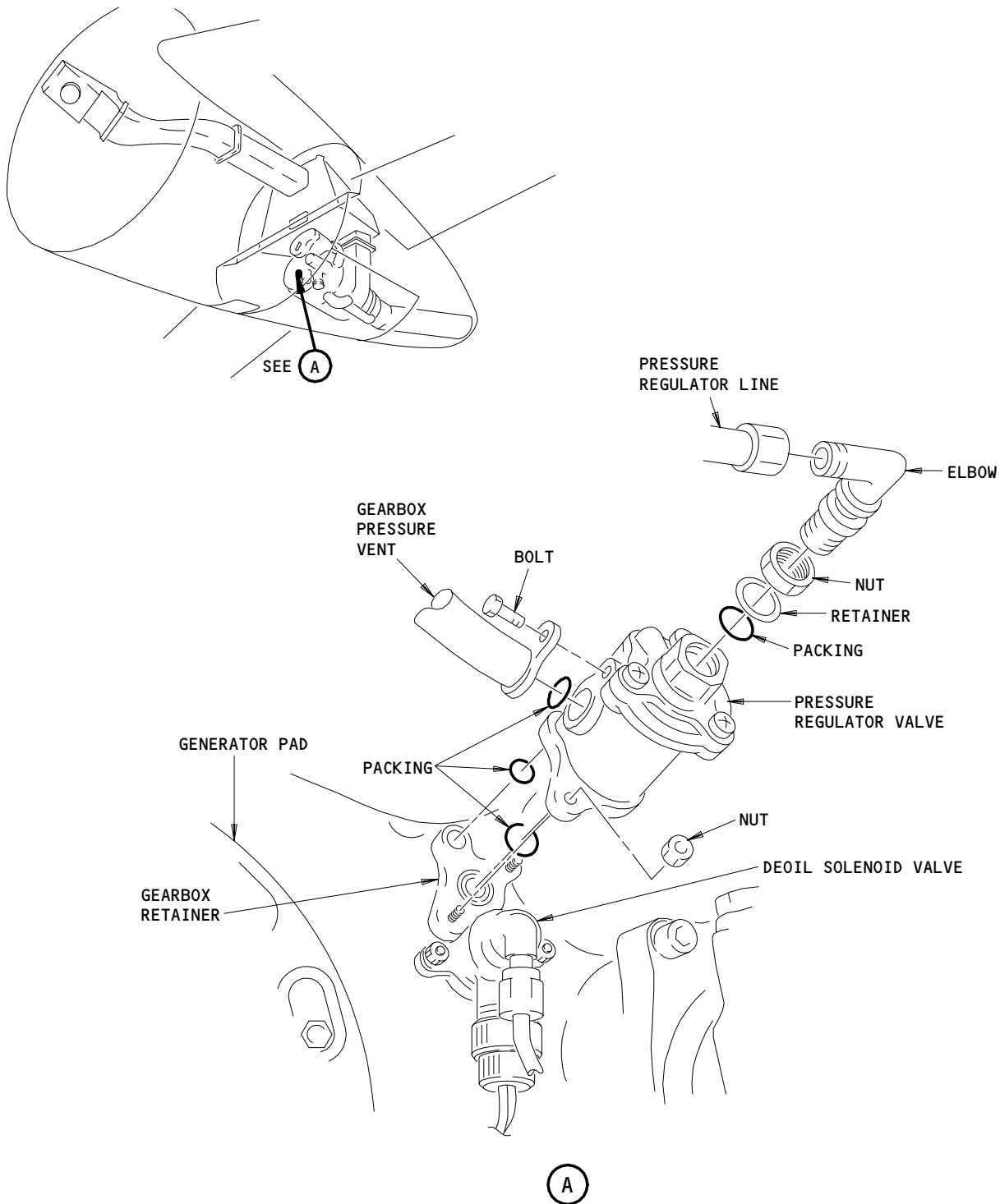
EFFECTIVITY

ALL

49-27-12

03

Page 401  
Aug 22/01



Gearbox Pressure Regulator Valve Installation  
Figure 401

EFFECTIVITY	
	ALL

49-27-12

01

Page 402  
May 10/91

2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the pressure regulator valve for the gearbox:

(a) Remove the bolt that attaches the gearbox pressure vent to the pressure regulator valve.

(b) Remove the gearbox pressure vent and the packing from the pressure regulator valve.

1) Discard the packing.

(c) Disconnect the pressure regulator line from the elbow.

(d) Remove the elbow, the nut, the retainer, and the packing from the pressure regulator valve.

1) Discard the retainer and the packing.

(e) Remove the nuts that attach the pressure regulator valve to the gearbox.

(f) Remove the pressure regulator valve and the packings from the gearbox.

1) Discard the packings.

EFFECTIVITY

ALL

49-27-12

03

Page 403  
Aug 22/02



TASK 49-27-12-404-006

3. Gearbox Pressure Regulator Valve Installation (Fig. 401)

A. References

(1) AMM 12-13-04/301, APU Servicing

B. Consumable Materials

(1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

(2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Gearbox Pressure Regulator Valve Packing Packing	49-27-12	01	50 60 65

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the pressure regulator valve for the gearbox:
  - (a) Lubricate the new packings with a light coat of lubricant or oil.
  - (b) Install the packings on the pressure regulator valve.
  - (c) Attach the pressure regulator valve to the gearbox with the nuts.
    - 1) Tighten the nuts to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (d) Lubricate the new packing with a light coat of lubricant or oil.
  - (e) Install the packing on the gearbox pressure vent.
  - (f) Attach the gearbox pressure vent to the pressure regulator valve with the bolt.
    - 1) Tighten the bolt to 100-150 inch-pounds (11.3-17.0 newton-meters).

EFFECTIVITY

ALL

49-27-12

01

Page 404  
Aug 22/05

- (g) Lubricate the new packing with a light coat of lubricant or oil.
- (h) Install the elbow and the nut on the pressure regulator valve with a new retainer and the packing.
- (i) Connect the pressure regulator line to the elbow.

S 414-008

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-27-12

06

Page 405  
Aug 22/05

SHUTTLE VALVE - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the APU shuttle valve.
- B. The APU shuttle valve is on the right side of the APU inlet plenum. You can get access to the shuttle valve through the APU access doors.

TASK 49-27-13-004-001

2. APU Shuttle Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

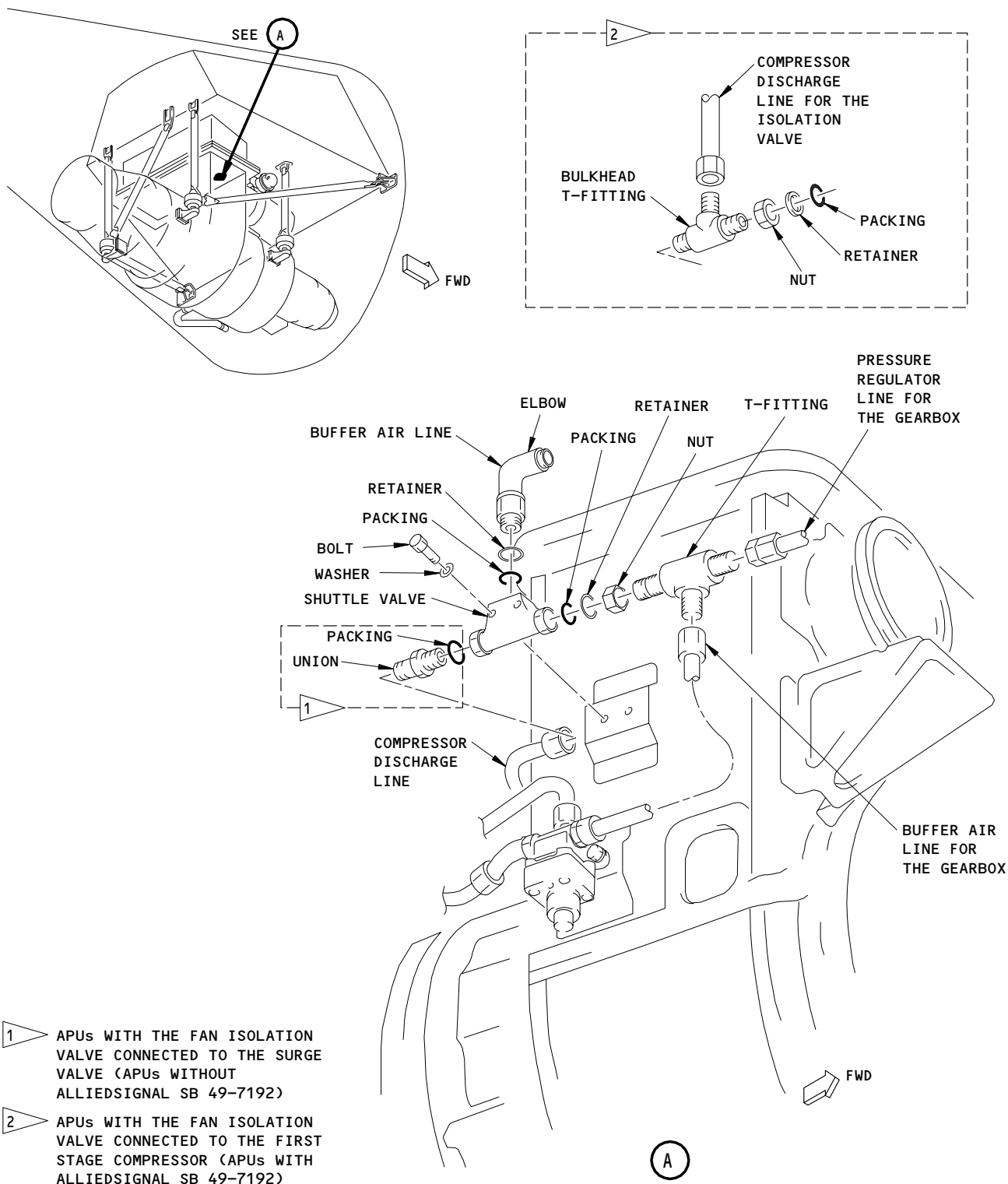
EFFECTIVITY

ALL

49-27-13

03

Page 401  
Aug 22/01



- 1 APUs WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE (APUs WITHOUT ALLIEDSIGNAL SB 49-7192)
- 2 APUs WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR (APUs WITH ALLIEDSIGNAL SB 49-7192)

Shuttle Valve Installation  
Figure 401

EFFECTIVITY	
	ALL

49-27-13

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE;  
Remove the APU shuttle valve:

(a) Disconnect the compressor discharge tube from the union.

(b) Remove the union and the packing from the shuttle valve.  
1) Discard the packing.

(c) Disconnect the buffer air tube from the elbow.

(d) Remove the elbow, the retainer, and the packing from the shuttle valve.  
1) Discard the packing and the retainer.

(e) Disconnect the pressure regulator tube for the gearbox from the T-fitting.

(f) Disconnect the buffer air tube for the gearbox from the T-fitting.

(g) Remove the bolts and the washers that attach the shuttle valve to the APU inlet plenum.

(h) Remove the shuttle valve and the T-fitting from the APU.

(i) Disconnect the shuttle valve from the T-fitting.

(j) Remove the packing, the retainer and the nut from the T-fitting.  
1) Discard the packing and the retainer.

EFFECTIVITY

ALL

49-27-13

01

Page 403  
Aug 22/01

S 024-012

- (5) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;

Remove the APU shuttle valve:

- (a) Disconnect the compressor discharge tube from the bulkhead T-fitting.
- (b) Disconnect the compressor discharge tube for the fan isolation valve from the bulkhead T-fitting.
- (c) Disconnect the buffer air tube from the elbow.
- (d) Remove the elbow, the retainer, and the packing from the shuttle valve.
  - 1) Discard the packing and the retainer.
- (e) Disconnect the pressure regulator tube for the gearbox from the T-fitting.
- (f) Disconnect the buffer air tube for the gearbox from the T-fitting.
- (g) Remove the bolts and the washers that attach the shuttle valve to the APU inlet plenum.
- (h) Remove the shuttle valve, T-fitting and bulkhead T-fitting from the APU.
- (i) Disconnect the bulkhead T-fitting from the shuttle valve.
- (j) Remove the nut, the retainer and the packing from the bulkhead T-fitting.
  - 1) Discard the packing and the retainer.
- (k) Disconnect the shuttle valve from the T-fitting.
- (l) Remove the packing, the retainer and the nut from the T-fitting.
  - 1) Discard the packing and the retainer.

TASK 49-27-13-404-006

3. APU Shuttle Valve Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

EFFECTIVITY

ALL

49-27-13

01

Page 404  
Dec 22/02

(2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Shuttle Valve Packing	49-27-00 (TBD)	01	116

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE;  
Install the APU shuttle valve:
- (a) Lubricate the new packing with a light coat of lubricant or oil.
  - (b) Install the nut with a new retainer and the packing on the T-fitting.
  - (c) Connect the T-fitting to the shuttle valve.
  - (d) Install the washers and the bolts that attach the shuttle valve to the APU inlet plenum.
    - 1) Tighten the bolts to 50-55 inch-pounds (5.7-6.3 newton-meters).
  - (e) Connect the buffer air tube for the gearbox to the T-fitting.
  - (f) Connect the pressure regulator tube for the gearbox to the T-fitting.
  - (g) Lubricate the new packing with a light coat of lubricant or oil.
  - (h) Install the elbow on the shuttle valve with the packing and a new retainer.
  - (i) Connect the buffer air tube to the elbow.
  - (j) Lubricate the new packing with a light coat of lubricant or oil.
  - (k) Install the union on the valve with the packing.
  - (l) Connect the compressor discharge tube to the union.

EFFECTIVITY

ALL

49-27-13

01

Page 405  
Aug 22/05

S 424-013

- (2) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;

Install the APU shuttle valve:

- (a) Lubricate the new packing with a light coat of lubricant or oil.
- (b) Install the nut, a new retainer and the packing on the T-fitting.
- (c) Connect the T-fitting to the shuttle valve.
- (d) Lubricate the new packing with a light coat of lubricant or oil.
- (e) Install the nut, a new retainer and the packing on the bulkhead T-fitting.
- (f) Connect the bulkhead T-fitting to the shuttle valve.
- (g) Install the washers and the bolts that attach the shuttle valve to the APU inlet plenum.
  - 1) Tighten the bolts to 50-55 inch-pounds (5.7-6.3 newton-meters).
- (h) Connect the buffer air tube for the gearbox to the T-fitting.
- (i) Connect the pressure regulator tube for the gearbox to the T-fitting.
- (j) Lubricate the new packing with a light coat of lubricant or oil.
- (k) Install the elbow on the shuttle valve with the packing and a new retainer.
- (l) Connect the buffer air tube to the elbow.
- (m) Connect the compressor discharge tube for the fan isolation valve to the bulkhead T-fitting.
- (n) Connect the compressor discharge tube to the bulkhead T-fitting.

S 414-008

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-13

01

Page 406  
Aug 22/01



S 864-009

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-010

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-27-13

03

Page 407  
Aug 22/01

LOW OIL TEMPERATURE SWITCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the low oil temperature switch on the APU.
- B. The low oil temperature switch is installed in a port aft of the generator scavenge return port. A magnetic chip detector is installed in the generator scavenge return port.
- C. The switch closes when the reservoir oil temperature is below 25°F ±7°F. When the switch closes, the APU de-oil system operates to remove the oil from the system.
- D. You can get access to the low oil temperature switch through the APU access doors.

TASK 49-27-14-004-002

2. Low Oil Temperature Switch Removal (Fig. 401)

- A. Standard Tools and Equipment
  - (1) Container - 100 cc capacity, for oil

- B. Access

- (1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

- (2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

- C. Procedure

- S 864-001

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

- S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
    - (a) P11 Overhead Panel
      - 1) 11B35, APU ALTN CONT

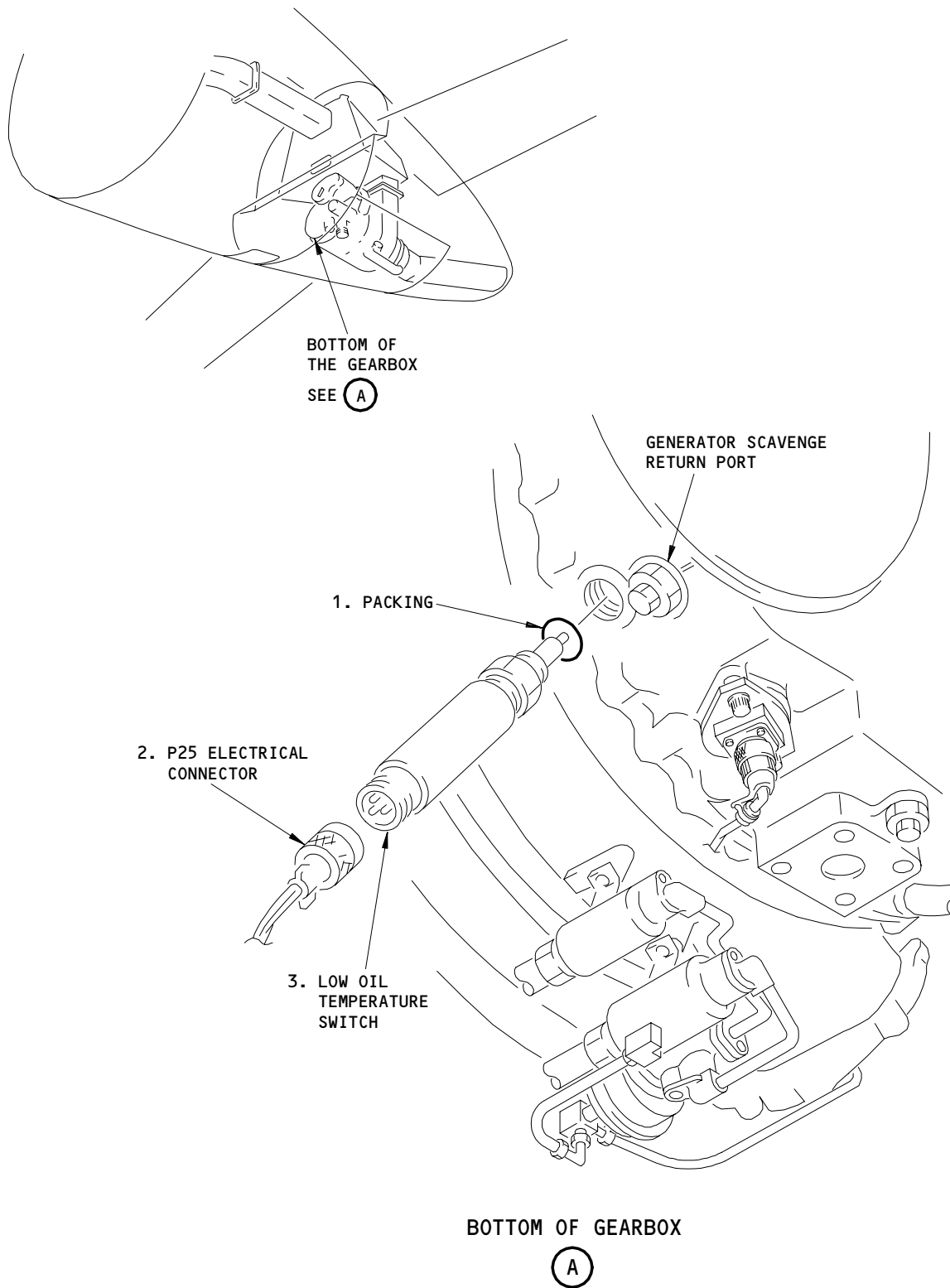
EFFECTIVITY

ALL

49-27-14

04

Page 401  
Aug 22/01



Low Oil Temperature Switch Installation  
Figure 401

EFFECTIVITY	ALL

49-27-14

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the low oil temperature switch:

- (a) Disconnect the P25 electrical connector (2) from the low oil temperature switch (3).
- (b) Install caps on the low oil temperature switch (3) and the P25 electrical connector (2) for protection.
- (c) Put the container below the low oil temperature switch (3).
- (d) Remove the low oil temperature switch (3) and the packing (1) from the bottom of the APU gearbox.
  - 1) Discard the packing (1).
- (e) Let the oil fully drain from the port for the low oil temperature switch.

NOTE: Approximately 100 cc of oil will drain out of the gearbox when you remove the switch.

EFFECTIVITY

ALL

49-27-14

04

Page 403  
Dec 22/07

TASK 49-27-14-404-006

3. Low Oil Temperature Switch Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. References

- (1) AMM 12-13-04/301, APU Servicing (Fill the Oil)
- (2) AMM 49-11-00/201, Auxiliary Power Unit

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Packing	49-94-00	01	60
	3	Low Oil Temperature Switch			55

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

(1) Install the low oil temperature switch:

- (a) Lubricate the new packing (1) with a light coat of lubricant or oil.
- (b) Install the packing (1) on the low oil temperature switch (3).
- (c) Install the low oil temperature switch (3) in the port on the bottom of the APU gearbox.
  - 1) Tighten the low oil temperature switch (3) to 60 inch-pounds (6.8 newton-meters).

EFFECTIVITY

ALL

49-27-14

02

Page 404  
Aug 22/05

- (d) Remove the caps from the low oil temperature switch (3) and the P25 electrical connector (2).
- (e) Connect the P25 electrical connector (2) to the low oil temperature switch (3).
- (f) Install a lockwire on the P25 electrical connector (2).

S 614-008

- (2) Do the servicing for the APU oil reservoir (AMM 12-13-04/301).

S 864-011

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-012

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-009

- (5) Do a leakage test for the installation of the low oil temperature switch:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the low oil temperature switch for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-010

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-14

06

Page 405  
Aug 22/02

GENERATOR FILTER DIFFERENTIAL PRESSURE SWITCH -  
REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the differential pressure switch for the generator filter.
- B. The differential pressure switch is on the housing for the generator filter. You can get access to the switch through the APU access doors.

TASK 49-27-15-004-001

2. Generator Filter Differential Pressure Switch Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

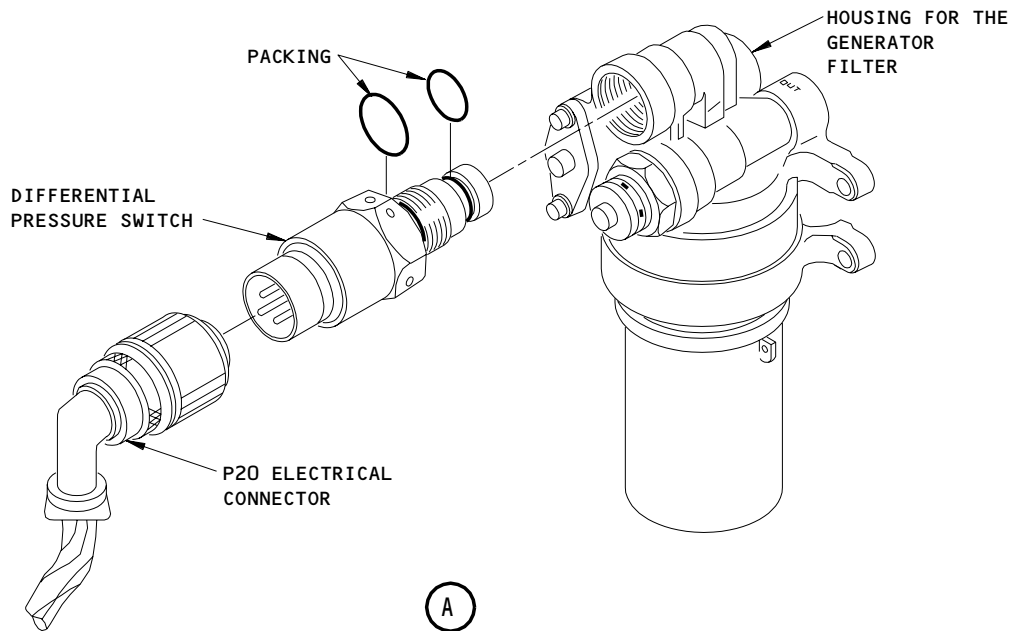
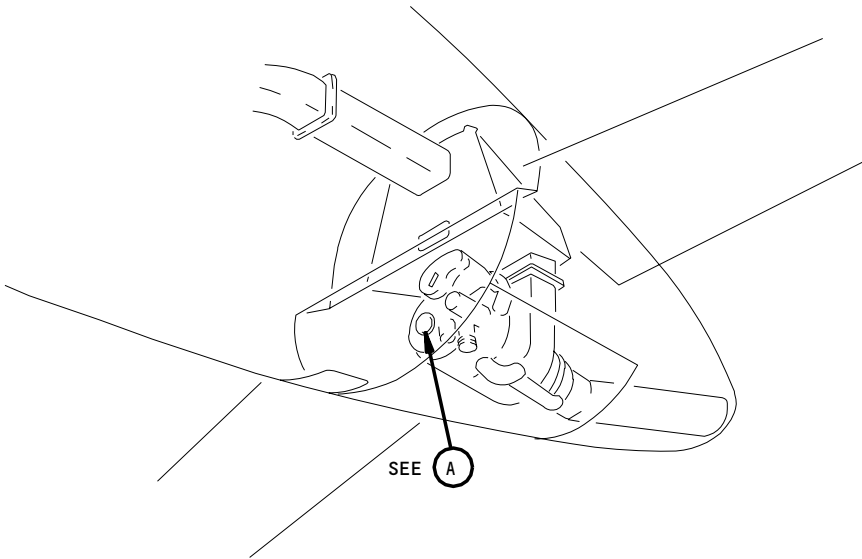
EFFECTIVITY

ALL

49-27-15

03

Page 401  
Aug 22/01



Generator Filter Differential Pressure Switch  
Figure 401

EFFECTIVITY	
	ALL

49-27-15

01

Page 402  
Apr 22/01



2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the differential pressure switch:

(a) Disconnect the P20 electrical connector from the differential pressure switch.

WARNING: DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

(b) Remove the differential pressure switch from the housing for the generator oil filter.

(c) Remove and discard the packings.

TASK 49-27-15-404-006

3. Generator Filter Differential Pressure Switch Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

EFFECTIVITY

ALL

49-27-15

03

Page 403  
Dec 22/02

- (2) D00341 Lubricant - Santovac 5
- B. References
  - (1) AMM 12-13-04/301, APU Servicing
  - (2) AMM 49-11-00/201, Auxiliary Power Unit
- C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Generator Filter Differential Pressure Switch Packing Packing	49-27-15	01	50  55 60

- D. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right
    - 822 Aft Cargo Door

E. Procedure

- S 424-007
  - (1) Install the differential pressure switch:
    - (a) Lubricate the new packings with a light coat of lubricant or oil.
    - (b) Install the packings on the differential pressure switch.
    - (c) Install the differential pressure switch in the housing for the generator oil filter.
      - 1) Tighten the switch to 110-120 inch-pounds (12.4-13.6 newton-meters).
    - (d) Install a lockwire on the switch.
    - (e) Connect the P20 electrical connector to the differential pressure switch.
    - (f) Install a lockwire on the P20 electrical connector.
- S 864-008
  - (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
    - (a) P49 APU Auxiliary Panel
      - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-27-15

05

Page 404  
Aug 22/05

- 2) 49C3, APU START
- (b) P11 Overhead Panel
- 1) 11B35, APU ALTN CONT

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-010

- (4) Do a leakage test for the installation of the differential pressure switch:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the differential pressure switch for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-15

03

Page 405  
Aug 22/01

GENERATOR FILTER DIFFERENTIAL PRESSURE INDICATOR –  
REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the differential pressure indicator on the generator filter.
- B. The differential pressure indicator is on the housing for the generator oil filter. The indicator comes out at 20 ±5 psid. You must replace the generator filter when the indicator comes out.
- C. You can get access to the differential pressure indicator through the APU access doors.

TASK 49-27-16-004-001

2. Generator Filter Differential Pressure Indicator Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

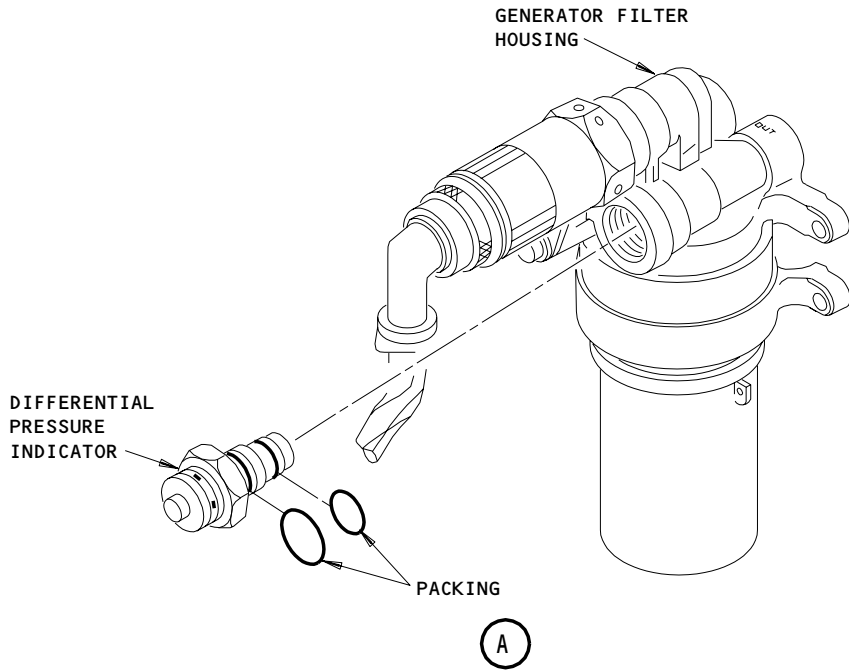
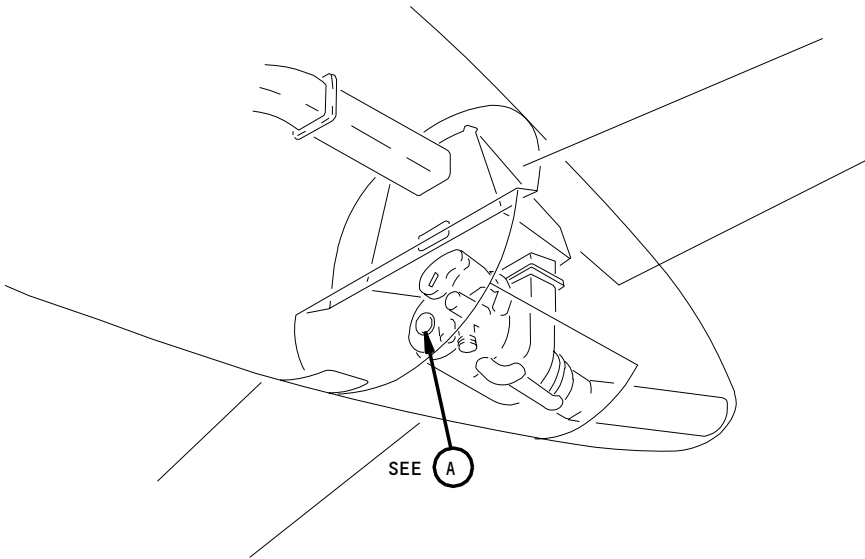
EFFECTIVITY

ALL

49-27-16

01

Page 401  
Aug 22/01



Generator Filter Differential Pressure Indicator Installation  
Figure 401

EFFECTIVITY	ALL
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49-27-16

234802

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

**NOTE:** The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

**NOTE:** You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

**NOTE:** The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the differential pressure indicator:

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

- (a) Remove the differential pressure indicator from the housing for the generator oil filter.
  - (b) Remove and discard the packings on the differential pressure indicator.

TASK 49-27-16-404-006

3. Generator Filter Differential Pressure Indicator Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

EFFECTIVITY

ALL

49-27-16

04

Page 403  
Dec 22/02

- (2) D00341 Lubricant - Santovac 5
- B. References
  - (1) AMM 12-13-04/301, APU Servicing
  - (2) AMM 49-11-00/201, Auxiliary Power Unit
- C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Generator Filter Differential	49-27-03	01	115
		Pressure Indicator			120
		Packing			125

- D. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right
    - 822 Aft Cargo Door

E. Procedure

- S 424-007
  - (1) Install the differential pressure indicator:
    - (a) Lubricate the new packings with a light coat of lubricant or oil.
    - (b) Install the packings on the differential pressure indicator.
    - (c) Install the differential pressure indicator in the housing for the generator oil filter.
      - 1) Tighten the differential pressure indicator to 110-120 inch-pounds (12.4-13.6 newton-meters).
    - (d) Install a lockwire on the differential pressure indicator.
- S 864-008
  - (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
    - (a) P49 APU Auxiliary Panel
      - 1) 49C2, APU PRIME CONT
      - 2) 49C3, APU START
    - (b) P11 Overhead Panel
      - 1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-27-16

03

Page 404  
Aug 22/05

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-010

- (4) Do a leakage test for the installation of the differential pressure indicator:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the indicator installation for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-27-16

03

Page 405  
Aug 22/01



APU FUEL SYSTEM - DESCRIPTION AND OPERATION

1. General

A. Engine Fuel System (Fig. 1)

- (1) The engine fuel system of the APU provides pressurized metered fuel to the combustion chamber and pressurized fuel to the actuator for the inlet guide vanes. The main fuel tank on the left side of the airplane supplies the fuel. The system consists of a fuel control unit, a flow divider, nozzles and manifolds. Electrical power for the system is 28 volts dc.
- (2) Fuel is pumped to the fuel control unit of the APU by the ac or dc fuel pump in the left airplane wing. The ac fuel boost pump on the left forward side is used when bus power for ac ground service is available. When no ac ground power is available, the dc fuel pump for the APU is used. The fuel shutoff valve for the APU, located in the left airplane wing, opens when the master control switch is placed to ON or START. Fuel flows back to the fuel control unit where it is pressurized and metered. It passes through the fuel flow divider which directs the fuel to the primary and secondary fuel nozzles as required.

2. Component Details

A. Fuel Control Unit (Fig. 2)

- (1) The fuel control unit pressurizes and meters fuel going to the fuel flow divider. It also provides pressurized fuel to the actuator for the inlet guide vanes. The unit consists of the following in fuel flow order: inlet filter, fuel pump, high-pressure relief valve, high pressure filter, actuator pressure regulator, fuel metering assembly, pressurizing valve, and the shutoff solenoid valve for the fuel. The unit is mounted to the front of the lube pump assembly by a QAD clamp. Fuel is drained from the unit through a drain tube connected to its underside.
- (2) Inlet Filter
  - (a) The inlet filter is located at the inlet of the fuel pump, bolted to the fuel control unit. It is a 10 micron disposable filter element. A delta pressure indicator pops out to indicate the need for fuel filter replacement. A filter bypass valve activates to allow fuel to flow around a plugged inlet filter.

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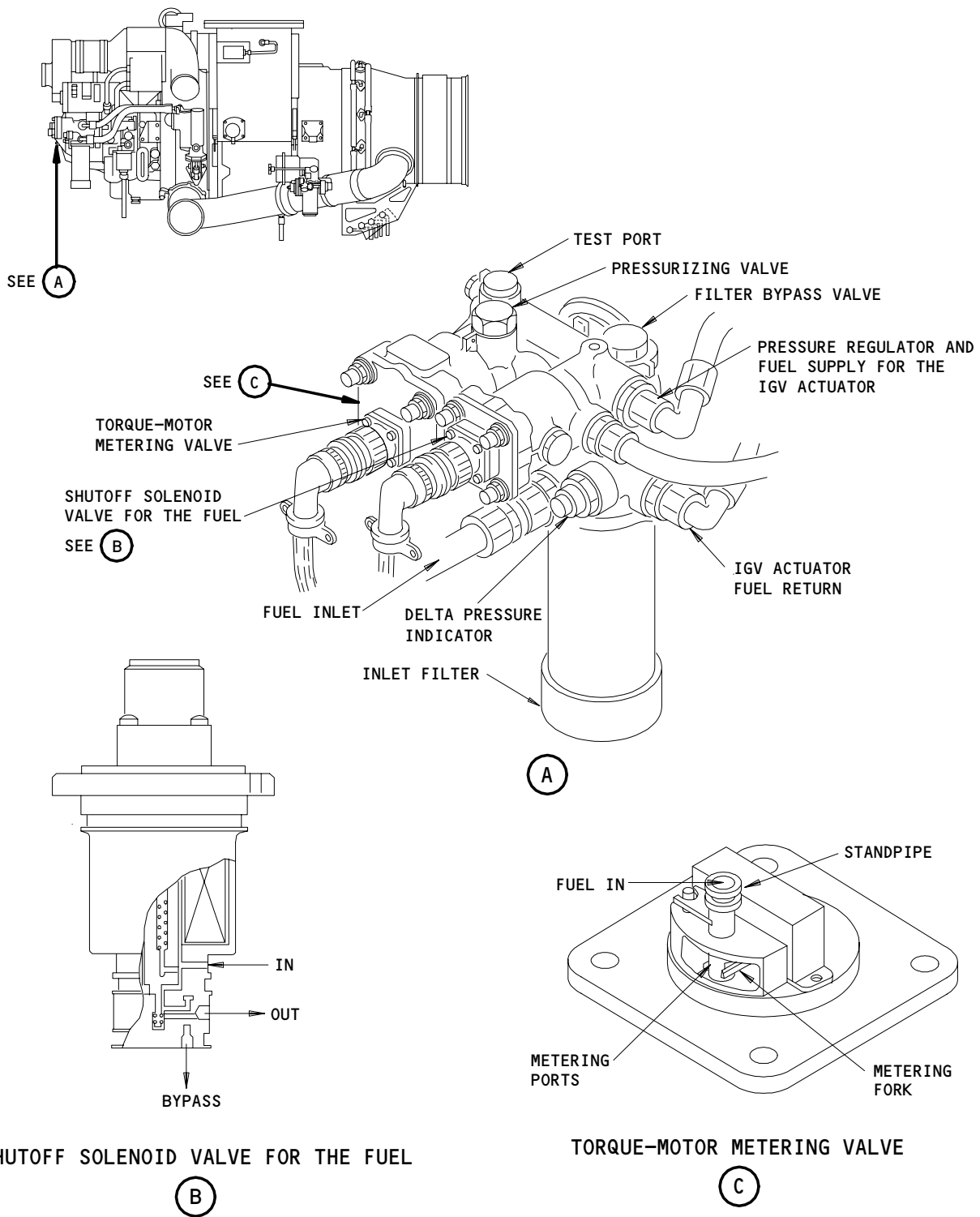
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49-31-00

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Page 1  
Dec 22/07





APU Fuel Control Unit  
Figure 2

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49-31-00

- (3) Fuel Pump
  - (a) The fuel pump provides pressurized fuel to the metering valve. It consists of two spur gears, supported by spring-loaded carbon bushings. The pump bushings are spring-loaded against the gear sides to reduce internal leakage and maintain pump efficiency as wear occurs. The gears and bushings are lubricated and cooled by fuel flowing through the pump. The pump is driven by an oil lubricated splined coupling from the lube pump assembly. Double carbon face seals prevent contamination between oil and fuel. A drain between the seals allows a quick check of seal conditions.
- (4) High-Pressure Relief Valve
  - (a) The high-pressure relief valve is located at the fuel pump outlet. It is a spring-loaded ball design to protect against over-pressurization of the system.
- (5) High Pressure Filter
  - (a) The high pressure filter is located at the outlet port of the fuel pump. It protects the fuel metering valve and the actuator for the inlet guide vanes from minute particles due to pump wear. The filter is a stainless steel screen which you can clean and is attached to a removable plug.
- (6) Actuator Pressure Regulator
  - (a) Power to the actuator for the inlet guide vanes is supplied by pressurized fuel from the fuel control unit. The actuator pressure regulator provides pressurized fuel for the IGV actuator.
- (7) Fuel Metering Assembly
  - (a) The fuel metering assembly meters the output of the fuel control unit to the engine for acceleration and governed speed operation. It consists of a torque-motor metering valve and a differential pressure regulator. These components are contained within the housing for the fuel control unit. The APU control unit electronically controls the torque-motor metering valve which adjusts the fuel flow rate for the required governed speed. The differential pressure regulator maintains a constant differential pressure across the metering valve.

EFFECTIVITY

ALL

49-31-00

01

Page 4  
Dec 22/07

- (8) Pressurizing Valve
  - (a) The pressurizing valve maintains the out-going fuel at a constant pressure during the early phase of the start cycle. It is located at the inlet to the shutoff solenoid valve.
- (9) Shutoff Solenoid Valve for the Fuel
  - (a) The shutoff solenoid valve for the fuel shuts off fuel to the flow divider. It is located at the outlet of the fuel control unit. It is a normally spring-loaded closed, direct acting, three way valve. A 28-volt dc source energizes the valve open with a signal from the APU control unit. Fuel flow cools the valve.
- B. Flow Divider (Fig. 3)
  - (1) The flow divider distributes fuel from the fuel control unit to the primary and secondary nozzles. It consists of a screen filter, run and start sequence valves, solenoid valve, primary drain valve, and secondary drain valve. The flow divider is mounted on the APU housing behind the surge control valve. At the inlet is a self-bypassing filter screen. The primary path for the fuel flow is open throughout APU start and run operation. The secondary fuel path, however, is restricted by start and run sequence valves which open at preset fuel pressures.
  - (2) The run sequence valve allows additional fuel to enter the secondary manifold after the solenoid valve opens at 95% speed. The run sequence valve has a lower setting than the start sequence valve which allows proper fuel atomization at lower supply pressure. Primary and secondary drain valves allow fuel to drain from the hoses and nozzles after fuel flow to the divider has stopped.
- C. Nozzles (Fig. 4)
  - (1) The nozzles atomize and inject fuel into the engine combustor. There are six primary nozzles for starting and APU operation and six secondary nozzles for running and high altitude operation. The nozzles are connected to manifolds which receive fuel from the fuel metering valve. They are equally spaced around the engine periphery.
  - (2) The primary nozzles are designed for high atomizing ability during the low pressures at low flow rate. This helps with engine light-off during the start cycle. The secondary nozzles are brought into use when a high flow rate exists.
- D. Manifolds (Fig. 4)
  - (1) The manifolds provide a fuel flow path from the flow divider to the fuel nozzles. The manifolds are insulated flexible lines.

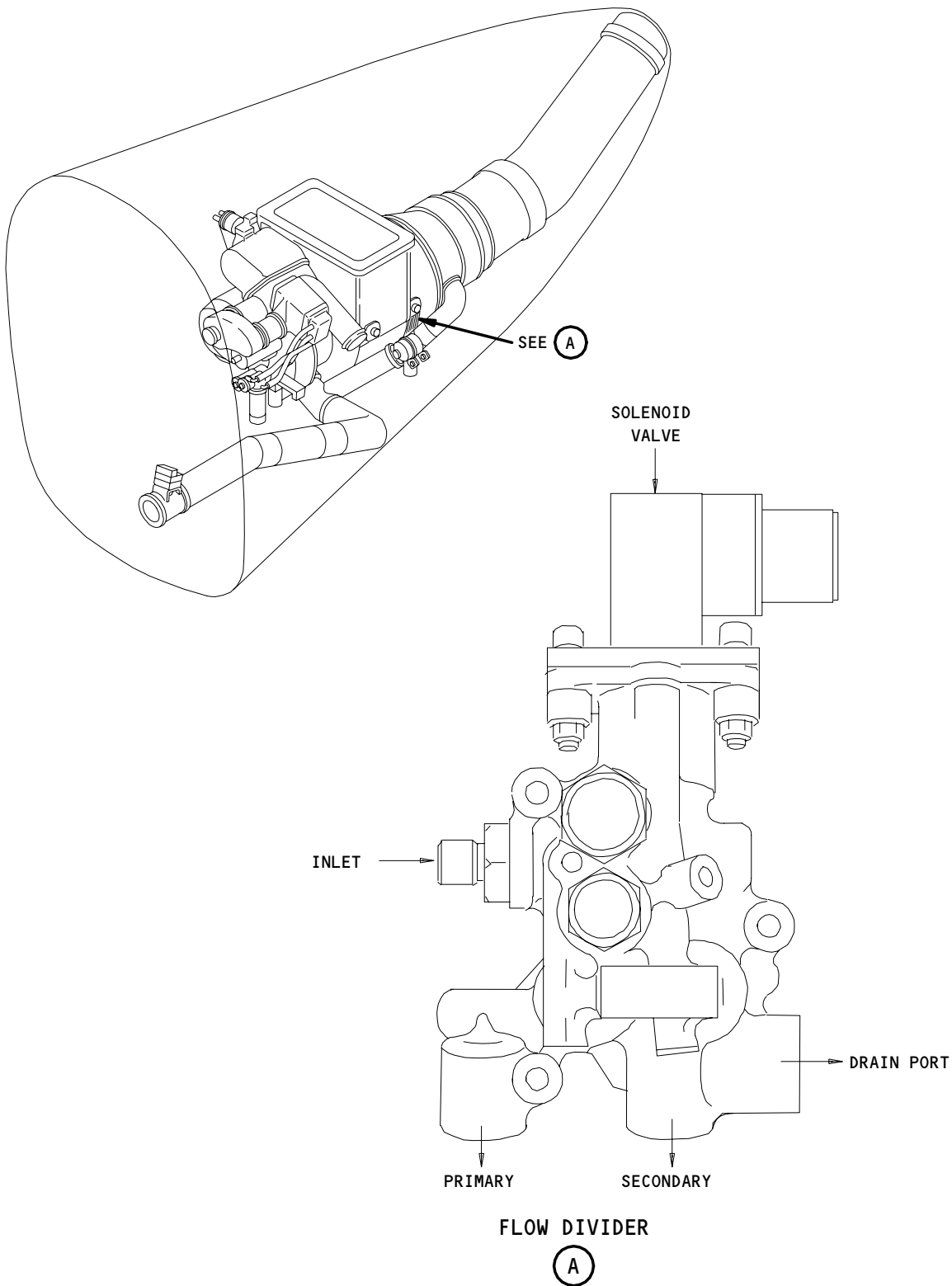
EFFECTIVITY

ALL

49-31-00

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Page 5  
May 10/92



APU Fuel Flow Divider  
Figure 3

EFFECTIVITY	
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49-31-00

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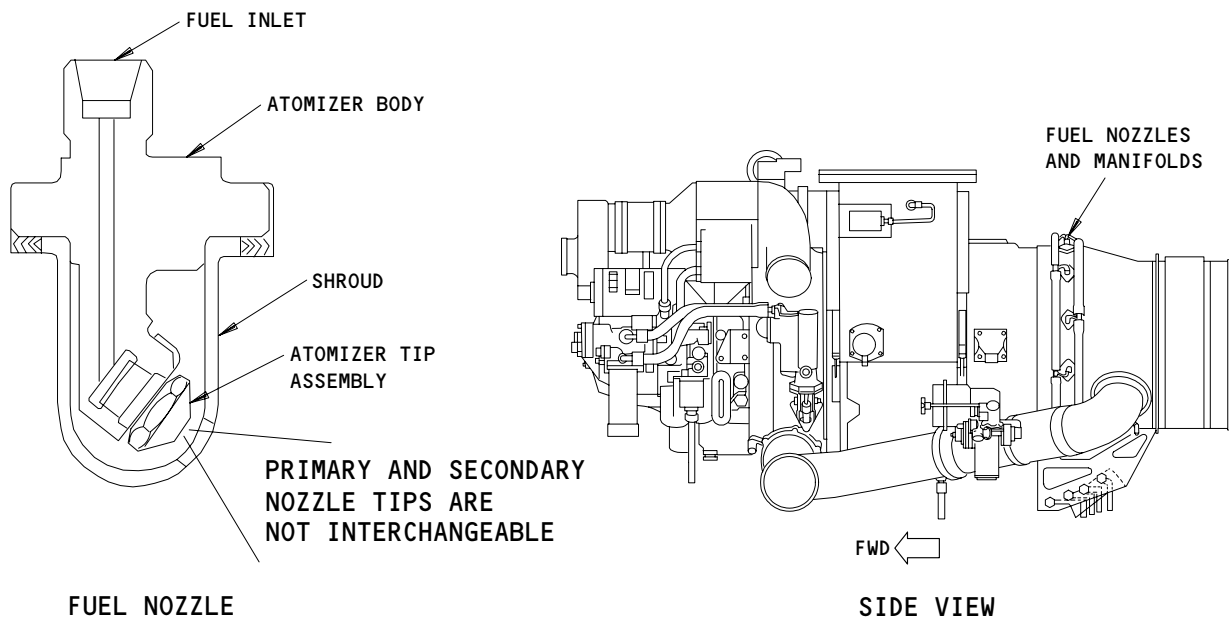
Page 6  
Feb 01/86

3. Operation

A. Functional Description

(1) Fuel System (Fig. 1)

(a) The APU fuel system is controlled automatically by the APU control unit. Positioning the master control switch for the APU to START, then releasing to ON, initiates APU start. The fuel shutoff valve for the APU is opened and a fuel pump (ac boost pump or APU dc fuel pump) is energized. A FAULT light on the master control panel illuminates momentarily while valve is opening. Fuel is supplied to the pump for the fuel control unit which sends pressurized fuel to the actuator for the inlet guide vanes and the torque-motor metering valve. The metering valve position is electronically controlled by the APU control unit. The fuel control solenoid is not opened until the starter motor rotates the engine above 7% speed.



APU Fuel Nozzles and Manifolds  
Figure 4

EFFECTIVITY	ALL
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**49-31-00**

- (b) At 7% governed speed, 28 volts dc is supplied to the fuel shutoff solenoid by the APU control unit. Fuel is allowed to flow through the flow divider and into the primary fuel nozzles. At the same time, ignition begins, combustion occurs, and the engine continues to accelerate.
- (c) At 50% speed, the starter motor de-energizes and the engine continues to accelerate under its own power. At 95% speed, the ignition unit de-energizes and the solenoid valve for the flow divider opens to allow additional fuel to flow to the secondary fuel nozzles. When a load is applied to the APU, the APU speed is kept constant by the fine speed governor in the electronic control unit which signals the torque motor for a greater or lesser fuel flow as load demand requires.
- (d) When a shutdown is initiated by positioning the master control switch for the APU to OFF, the control unit sends out a shutdown signal. The shutoff solenoid valve for the fuel is closed, stopping fuel flow to the nozzles. During shutdown, the master control switch also closes the fuel shutoff valve. If other controls (automatic shutdown, fire or remote shutdown switch) are used to shutdown the APU, a signal is supplied to activate the fire relay to close the A/C fuel shutoff valve.

**B. BITE**

- (1) The APU control unit monitors fuel system operation and writes the faults it finds in BITE memory (AMM 49-61-00/001). A failure of the fuel control unit, the solenoid valve for the fuel control, or the solenoid for the fuel flow divider is shown on the FAULTY LRU matrix. These failures are shown as FUEL CONTROL, FUEL SOL, or FLOW DIV SOL. An automatic shutdown because of NO LIGHTOFF, START ABORTED, or UNDERSPEED is shown on the REASON APU NOT OPERATING matrix.

EFFECTIVITY

ALL

**49-31-00**

02

Page 8  
Feb 10/95



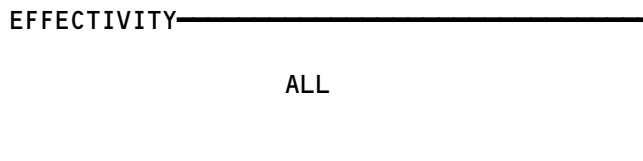
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FAULT ISOLATION/MAINT MANUAL

APU ENGINE FUEL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
COMPUTERS - (31-41-00/101) EICAS L, M10181 EICAS R, M10182 ELEMENT - FUEL FILTER	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-04
ELEMENT - FUEL FLOW DIVIDER FILTER	1	1	316AR,315AL, APU COMP, LEFT SIDE OF COMBUSTOR	49-31-08
FILTER - FUEL HIGH PRESSURE	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-07
HOSES - FUEL MANIFOLD	1	2	316AR,315AL, APU COMP, LEFT SIDE OF COMBUSTOR	49-31-09
MANIFOLDS AND NOZZLES	1	12	316AR,315AL, APU COMP, LEFT SIDE OF COMBUSTOR	49-31-06
MONOPOLE - (49-61-00/101) YBMTS8,YBMTS9 RESISTOR - EGT LOAD, R543, R550 SENSORS - (49-61-00/101) APU INLET PRESSURE, YBMTS4 APU INLET TEMPERATURE, YBMTS5 THERMOCOUPLE ASSEMBLY - (49-71-00/101) YBMTS6,YBMTS7	2	2	119AL, MAIN EQUIP CENTER, E8	*
UNIT - FUEL CONTROL	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-01
VALVE - FUEL CONTROL SOLENOID, YBMV1	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-02
VALVE - FUEL FILTER BYPASS	2	1	316AR,315AL, APU COMP, FRONT OF APU	49-31-05
VALVE - FUEL FLOW DIVIDER AND SOLENOID, YBMM2	1	1	316AR,315AL, APU COMP, LEFT SIDE OF COMBUSTOR	49-31-03

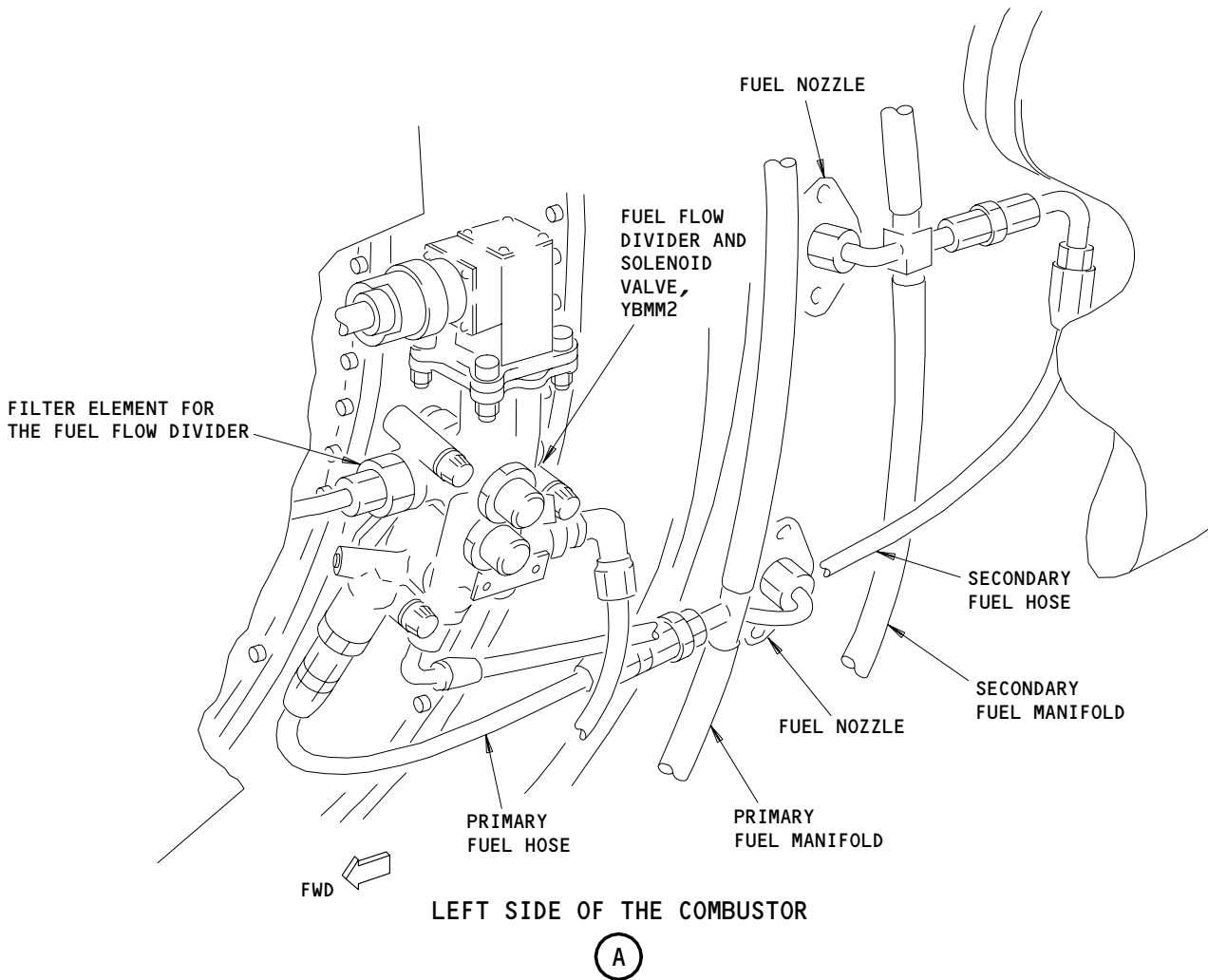
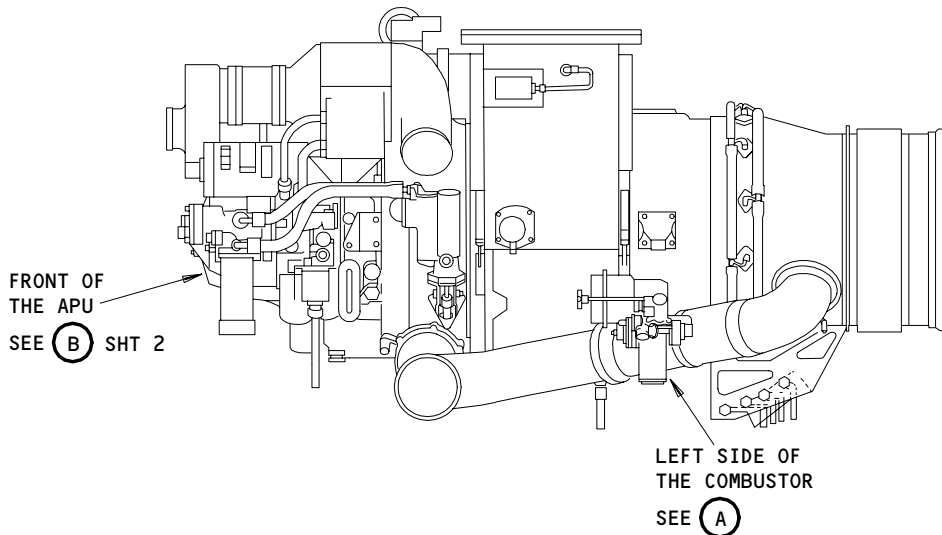
\* SEE THE WDM EQUIPMENT LIST

APU Engine fuel System - Component Index  
Figure 101



**49-31-00**

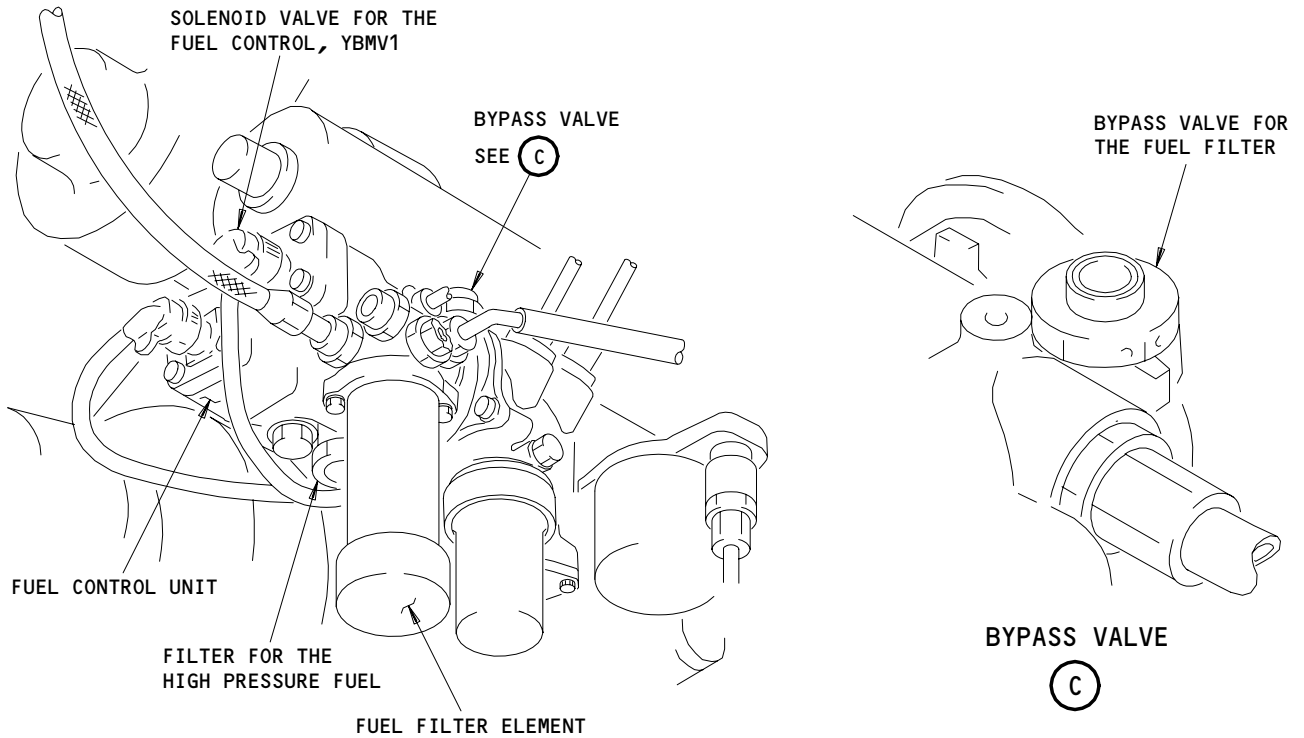
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FAULT ISOLATION/MAINT MANUAL



APU Engine Fuel System - Component Location  
Figure 102 (Sheet 1)

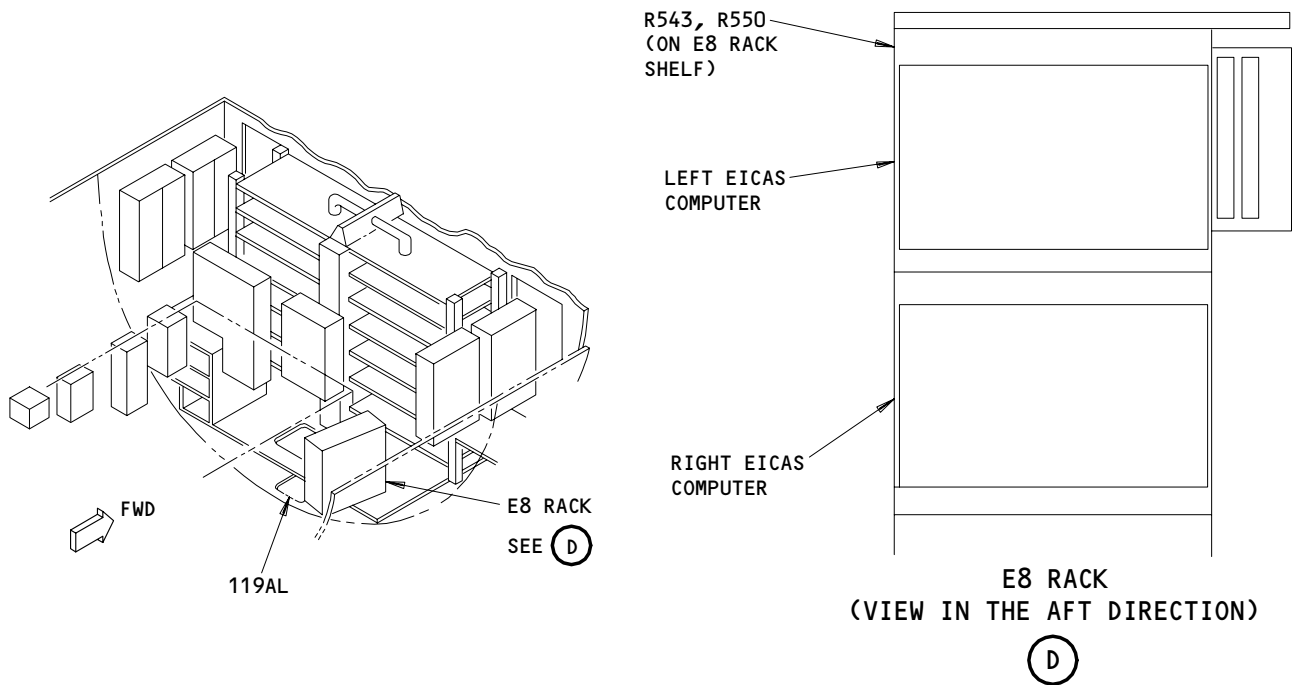
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49-31-00



FRONT OF THE APU

(B) FROM SHT 1



APU Engine Fuel System - Component Location  
Figure 102 (Sheet 2)

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**49-31-00**

01

Page 103  
Feb 10/92

APU FUEL SYSTEM - MAINTENANCE PRACTICES

1. General

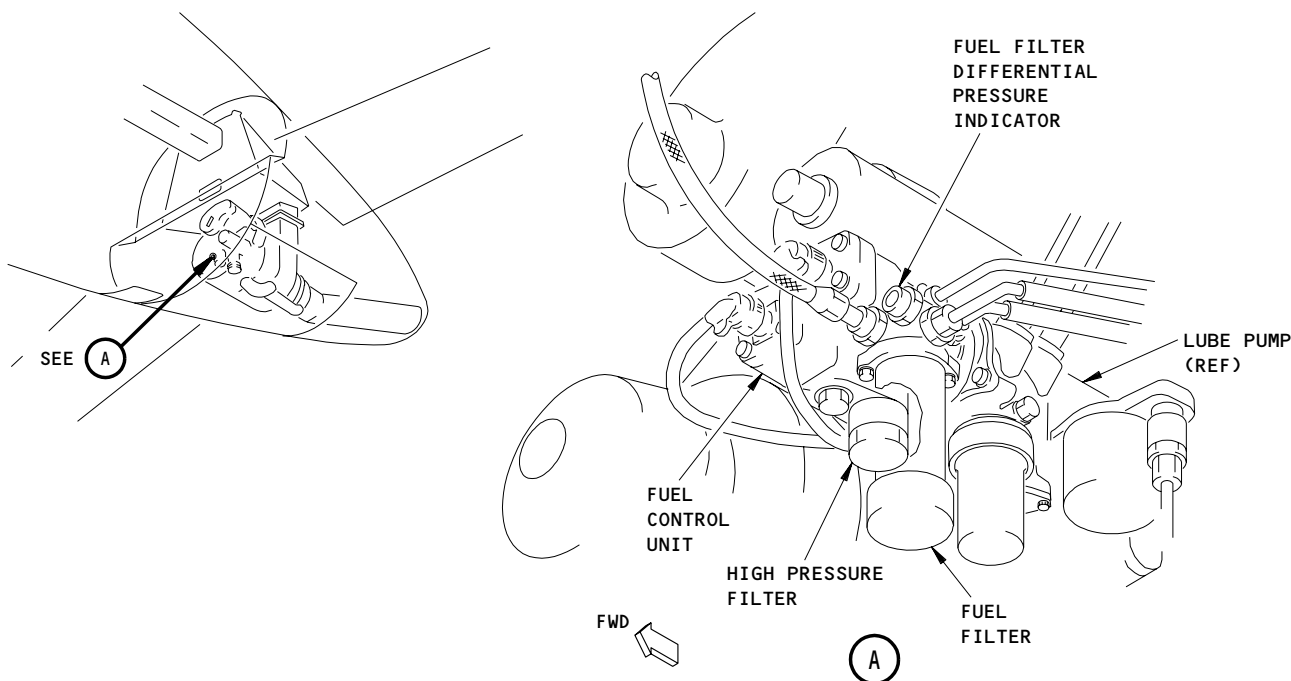
- A. This procedure contains a task to do an inspection of the APU fuel system for unwanted materials.
- B. To do the fuel system inspection you must remove the fuel from the system. You must also remove the low pressure filter and the high pressure filter.
- C. You can get access to the fuel system filters through the APU access doors.

TASK 49-31-00-202-001

2. APU Fuel System Inspection (Fig. 201)

A. References

- (1) AMM 49-31-01/401, Fuel Control Unit



APU Fuel System Contamination Check  
Figure 201

EFFECTIVITY	
	ALL

**49-31-00**

01

Page 201  
Dec 22/07

- (2) AMM 49-31-03/401, Fuel Flow Divider and Solenoid Valve
- (3) AMM 49-31-04/401, Fuel Filter Element
- (4) AMM 49-31-07/201, High Pressure Fuel Filter
- (5) AMM 49-52-02/401, Inlet Guide Vane Actuator

B. Access

- (1) Location Zones
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right

C. Procedure

S 282-006

- (1) Examine the APU fuel system for unwanted materials:
  - (a) Do this task: Low Pressure Filter Removal (AMM 49-31-04/401).
  - (b) Do this task: High Pressure Fuel Filter Removal (AMM 49-31-07/201).
  - (c) Examine the two filters for signs of corrosion and unwanted materials.
  - (d) Do this task: High Pressure Fuel filter Installation (AMM 49-31-07/201).
  - (e) Do this task: Low Pressure Filter Installation (AMM 49-31-04/401).

S 962-007

- (2) If you found corrosion or unwanted materials in the filters, replace the fuel system components:
  - (a) Replace the fuel flow divider (AMM 49-31-03/401).
    - 1) Flush the fuel line between the fuel flow divider and the fuel control unit with clean fuel.
  - (b) Replace the IGV actuator (AMM 49-52-02/401).
    - 1) Flush the fuel lines between the IGV actuator and the fuel control unit with clean fuel.
  - (c) Replace the fuel control unit (AMM 49-31-01/401).

EFFECTIVITY

ALL

49-31-00

01

Page 202  
Aug 22/01

FUEL CONTROL UNIT - REMOVAL/INSTALLATION

1. General

- A. There are two tasks in this procedure. The first task is used to remove the fuel control unit. The second task is used to install the fuel control unit.
- B. The fuel control unit is installed on the lube pump at the forward end of the APU.

TASK 49-31-01-004-001

2. Fuel Control Unit Removal (Fig. 401)

- A. Equipment
  - (1) Container - Fuel Resistant, 1 Gallon (4 Liters)
- B. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

C. Prepare to Remove the Fuel Control Unit

S 864-002

- (1) Make sure the APU control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

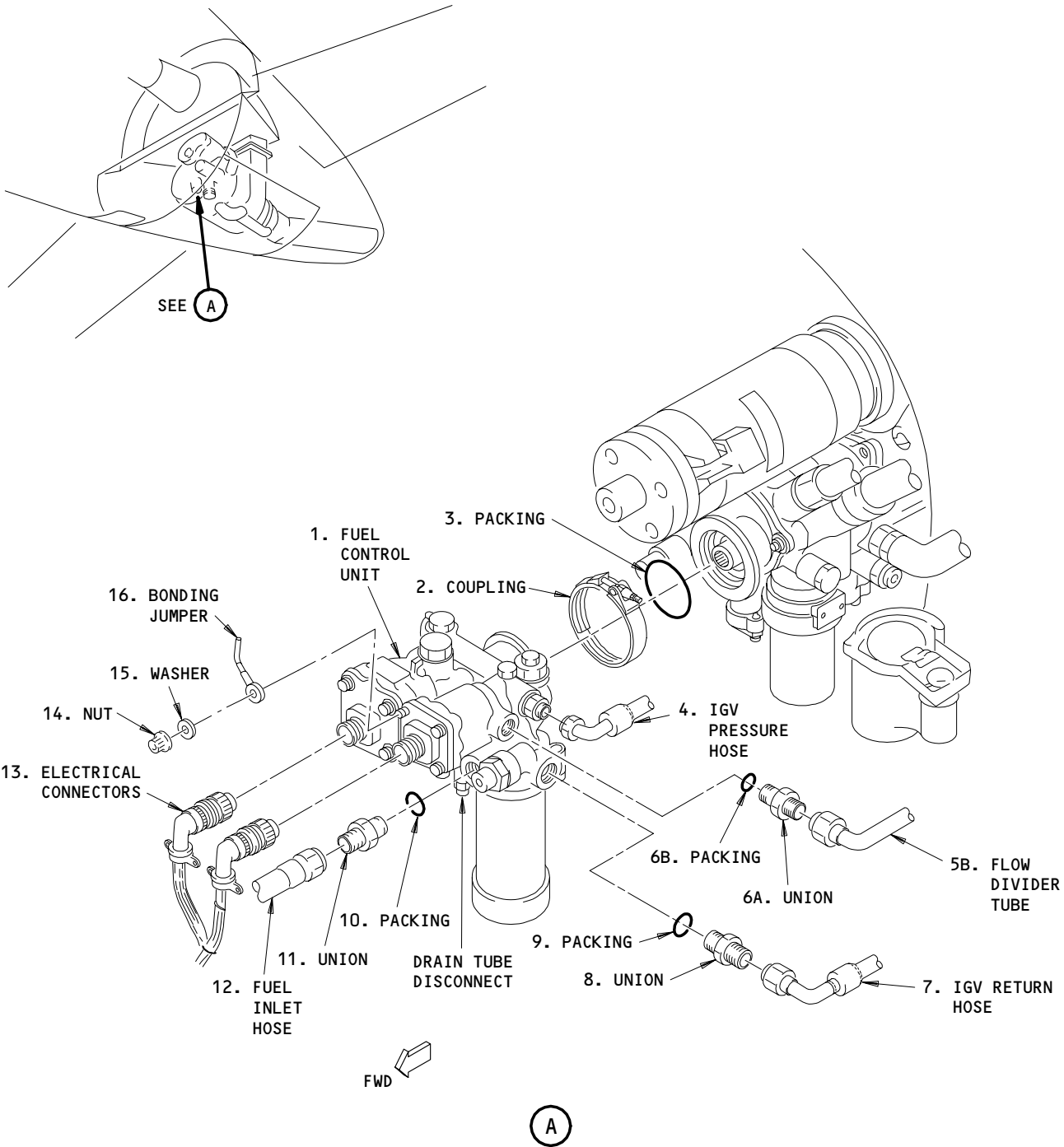
EFFECTIVITY

ALL

49-31-01

03

Page 401  
Dec 22/07



Fuel Control Installation  
Figure 401

EFFECTIVITY	
ALL	

49-31-01

2) 49C3, APU START

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

D. Remove the Fuel Control Unit

S 024-057

- (1) Disconnect the electrical connectors (13).

(a) Put caps on the electrical connectors and on the fuel control unit.

S 024-049

- (2) Remove the nut (14) and washer (15) to disconnect the bonding jumper from the fuel control unit.

S 024-050

- (3) Do these steps to disconnect the fuel inlet hose (12) from the fuel control unit (1):

(a) Put the container below the fuel inlet hose (12).

EFFECTIVITY

ALL

49-31-01

02

Page 403  
Dec 22/03



- (b) Disconnect the fuel inlet hose (12) from the fuel control unit (1).
- (c) Let the fuel drain from the fuel inlet hose.
- (d) Remove the union (11) and the packing (10).
- (e) Discard the packing (10).
- (f) Install caps on the fuel inlet hose and on the fuel inlet of the fuel control unit.

S 024-052

- (4) Do these steps to disconnect the flow divider tube (5B) from the fuel control unit:
  - (a) Put the container below the flow divider tube (5B).
  - (b) Disconnect the flow divider tube (5B) from the left side of the fuel control unit.
    - 1) Let the fuel drain from the flow divider tube.
    - 2) Put a cap on the flow divider tube.
  - (c) Remove the union (6A) with the packing (6B).
    - 1) Remove and discard the packing (6B).
    - 2) Put a cap on the port of the fuel control unit.

S 024-053

- (5) Do these steps to disconnect the IGV pressure hose (4) from the fuel control unit (1):
  - (a) Put the container below the IGV pressure hose (4).
  - (b) Disconnect the IGV pressure hose (4) from the fuel control unit (1).
  - (c) Let the fuel drain from the pressure hose.
  - (d) Put caps on the pressure hose and on the fuel control unit.

S 024-055

- (6) Do these steps to disconnect the IGV return hose (7) from the fuel control unit:
  - (a) Put the container below the IGV return hose (7).
  - (b) Disconnect the IGV return hose (7) from the fuel control unit.
  - (c) Let the fuel drain from the return hose.
  - (d) Remove the union (8) and the packing (9).
  - (e) Discard the packing (9).
  - (f) Put caps on the return hose and on the fuel control unit.

S 024-056

- (7) Do these steps to disconnect the drain tube disconnect from the bottom of the fuel control unit:
  - (a) Put the container below the drain tube disconnect.
  - (b) Disconnect the drain tube disconnect from the bottom of the fuel control unit.
  - (c) Put caps on the drain tube disconnect and fuel control unit.

EFFECTIVITY

ALL

49-31-01

02

Page 404  
Dec 22/03

S 024-014

- (8) Remove the coupling (2) to remove the fuel control unit (1).

**NOTE:** A small quantity of oil will drain when the fuel control unit is removed.

- (a) Remove and discard the packing (3).  
(b) Remove the container.

TASK 49-31-01-404-015

3. Fuel Control Unit Installation (Fig. 401)

A. Consumable Materials

- (1) D00205 Grease - Braycote 248  
(2) D00341 Lubricant - Santovac 5 or  
(3) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Fuel Control Assembly	49-31-00	01	65 or
			49-31-02	01	50 or
			49-31-05	01	50 or
			49-31-10	01	50
	3	Packing			154
	6B	Packing			14
	9	Packing			52
	10	Packing	49-11-00	01	185 or
			49-11-01	01	120

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit  
(2) AMM 49-61-05/201, APU Control Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

EFFECTIVITY

ALL

**49-31-01**

02

Page 405  
Aug 22/05

E. Fuel Control Unit Installation

S 434-017

- (1) Remove all of the caps from the fuel tubes and from the ports on the fuel control unit.

S 644-043

- (2) Lubricate the new packing (3) with a light coat of lubricant.

S 424-044

- (3) Install the packing (3) on the mount flange of the lube pump.

S 424-019

**CAUTION:** CAREFULLY ALIGN THE SHAFT BETWEEN THE LUBE PUMP AND THE CONTROL UNIT. IF THE SHAFT AND THE SHAFT COUPLING ARE NOT ALIGNED, YOU CAN DAMAGE THE FUEL CONTROL UNIT OR THE LUBE PUMP.

- (4) Put the fuel control unit (1) on the mount flange.
  - (a) Make sure the index pin is aligned.
  - (b) Install the coupling (2).
  - (c) Tighten the coupling to 20-22 inch-pounds (2.26-2.49 newton meters).

S 034-041

- (5) Connect the flow divider tube:
  - (a) Lubricate the new packing (6B) with a light coat of lubricant.
  - (b) Install the union (6A) on the fuel control unit with the packing (6B).
  - (c) Connect the flow divider tube (5B) to the union (6A).

S 034-022

- (6) Connect the drain tube to the bottom of the fuel control unit (1).

S 434-023

- (7) Connect the pressure hose (4) to the fuel control unit (1).

S 644-045

- (8) Lubricate the new packing (9) with a light coat of lubricant.

S 424-046

- (9) Install the union (8) with the packing (9) on the fuel control unit (1).

S 434-025

- (10) Connect the return hose (7) to the union (8).

EFFECTIVITY

ALL

49-31-01

05

Page 406  
Dec 22/07

S 644-048

- (11) Lubricate the new packing (10) with a light coat of lubricant.

S 424-047

- (12) Install the union (11) with the packing (10) on the fuel control unit (1).

S 434-027

- (13) Connect the fuel inlet hose (12) to the union (11).

S 434-028

- (14) Connect the bonding jumper to the fuel control unit with the nut (14) and the washer (15).  
(a) Tighten the nut (14) to 50-55 inch-pounds (5.65-6.21 newton meters).

S 434-029

- (15) Connect the electrical connectors (13).

F. Put the Airplane in its Usual Condition

S 864-030

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:  
(a) P49 APU Auxiliary Panel  
    1) 49C2, APU PRIME CONT  
    2) 49C3, APU START  
(b) P11 Overhead Panel  
    1) 11B35, APU ALTN CONT

S 744-032

- (2) Do the APU Control Unit - BITE procedure (AMM 49-61-05/201).

S 864-033

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch.

S 864-034

- (4) Do this task: APU Starting and Operation (AMM 49-11-00/201).

S 794-035

- (5) Examine the APU for leakage.

S 864-036

- (6) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

EFFECTIVITY

ALL

**49-31-01**

04

Page 407  
Aug 22/01

S 414-037

(7) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-31-01

02

Page 408  
Aug 22/01

FUEL CONTROL SOLENOID VALVE - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the valve for the fuel control solenoid.
- B. The valve for the fuel control solenoid is on the fuel control unit. The fuel control unit is on the forward end of the APU, below the starter motor.
- C. You can get access to the valve for the fuel control solenoid through the APU access doors.

TASK 49-31-02-004-002

2. Fuel Control Solenoid Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-001

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

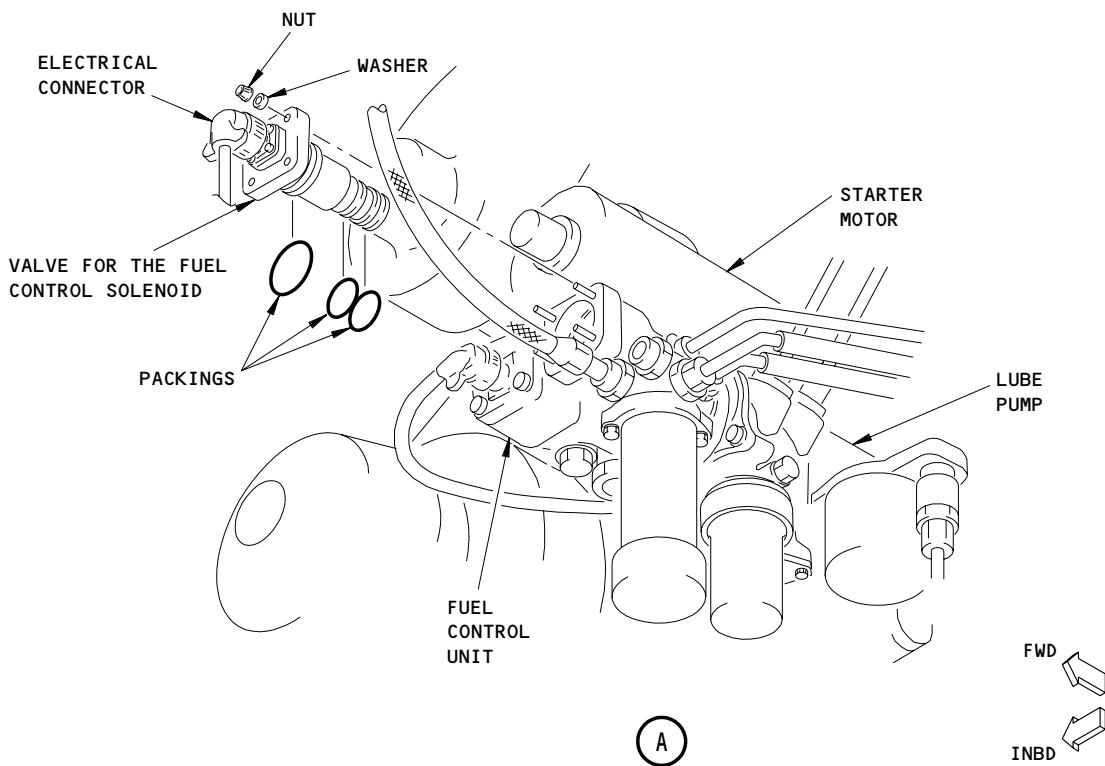
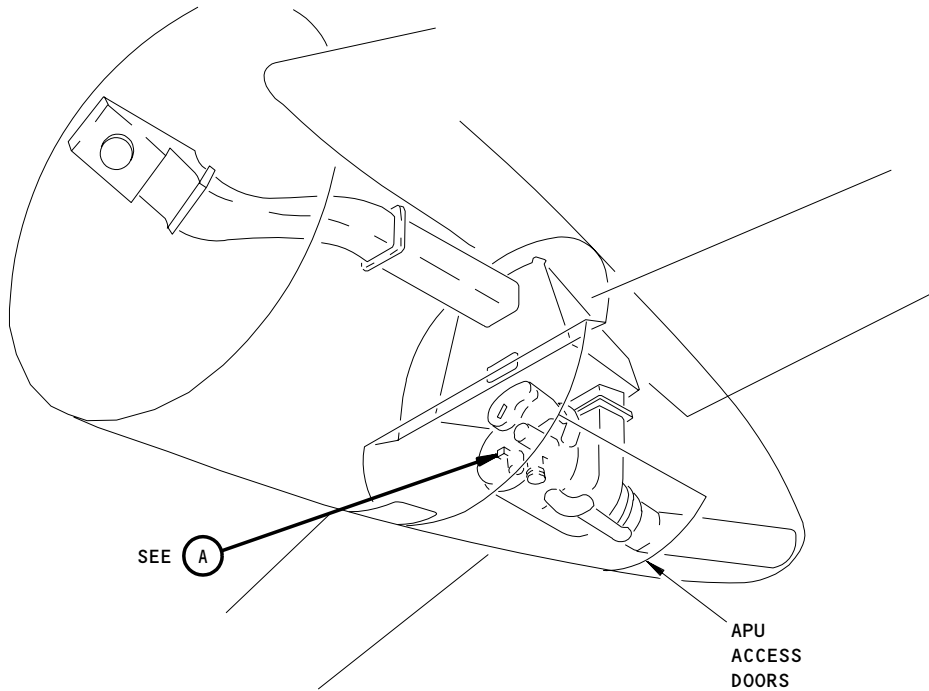
EFFECTIVITY

ALL

49-31-02

01

Page 401  
Aug 22/01



Fuel Control Solenoid Valve Installation  
Figure 401

EFFECTIVITY	
	ALL

49-31-02

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the valve for the fuel control solenoid:
  - (a) Disconnect the P9 electrical connector from the solenoid valve.
  - (b) Remove the four nuts and the washers that attach the solenoid valve to the fuel control unit.
  - (c) Remove the solenoid valve from the fuel control unit.
  - (d) Remove and discard the three packings on the solenoid valve.

TASK 49-31-02-404-006

3. Fuel Control Solenoid Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or

EFFECTIVITY

ALL

49-31-02

04

Page 403  
Aug 22/01



(2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. References

(1) AMM 49-11-00/201, Auxiliary Power Unit

(2) AMM 49-61-05/201, APU Control Unit

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Fuel Control Solenoid Valve Packing Packing Packing	49-31-02	01	65 70 75 80

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the valve for the fuel control solenoid:
- (a) Lubricate the new packings with a light coat of lubricant.
  - (b) Install the packings on the solenoid valve.
  - (c) Put the solenoid valve in its position on the fuel control unit.
  - (d) Install the four nuts and the washers that attach the solenoid valve to the fuel control unit.
    - 1) Tighten the nuts to 50-52 inch-pounds (5.7-5.9 newton-meters).
  - (e) Connect the P9 electrical connector to the solenoid valve.
  - (f) Install a lockwire on the P9 electrical connector.

S 734-008

- (2) Do this task: APU Control Unit - Self-Test (AMM 49-61-05/201).

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-31-02

04

Page 404  
Aug 22/05

- 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-011

- (5) Do a leakage test for the solenoid valve installation:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the solenoid valve for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-012

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-31-02

02

Page 405  
Aug 22/01

FUEL FLOW DIVIDER AND SOLENOID VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the fuel flow divider and the solenoid valve.
- B. The fuel flow divider and the solenoid valve are installed above the APU drain mast. The fuel flow divider has three fuel connections and a drain line. The solenoid valve has an electrical connection. The solenoid valve is on the fuel flow divider.
- C. The fuel flow divider solenoid valve is referred to as "solenoid valve" in this procedure.
- D. You can get access to the fuel flow divider and the solenoid valve through the APU access doors.

TASK 49-31-03-004-001

2. Solenoid Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 014-002

- (1) Remove the fuel flow divider (Ref par. 4).

S 024-005

- (2) Remove the solenoid valve:
  - (a) Disconnect the electrical connector from the solenoid valve (2).
  - (b) Remove the four nuts (6), washers (5), and the bolts (3) that attach the solenoid valve (2) to the fuel flow divider (4).

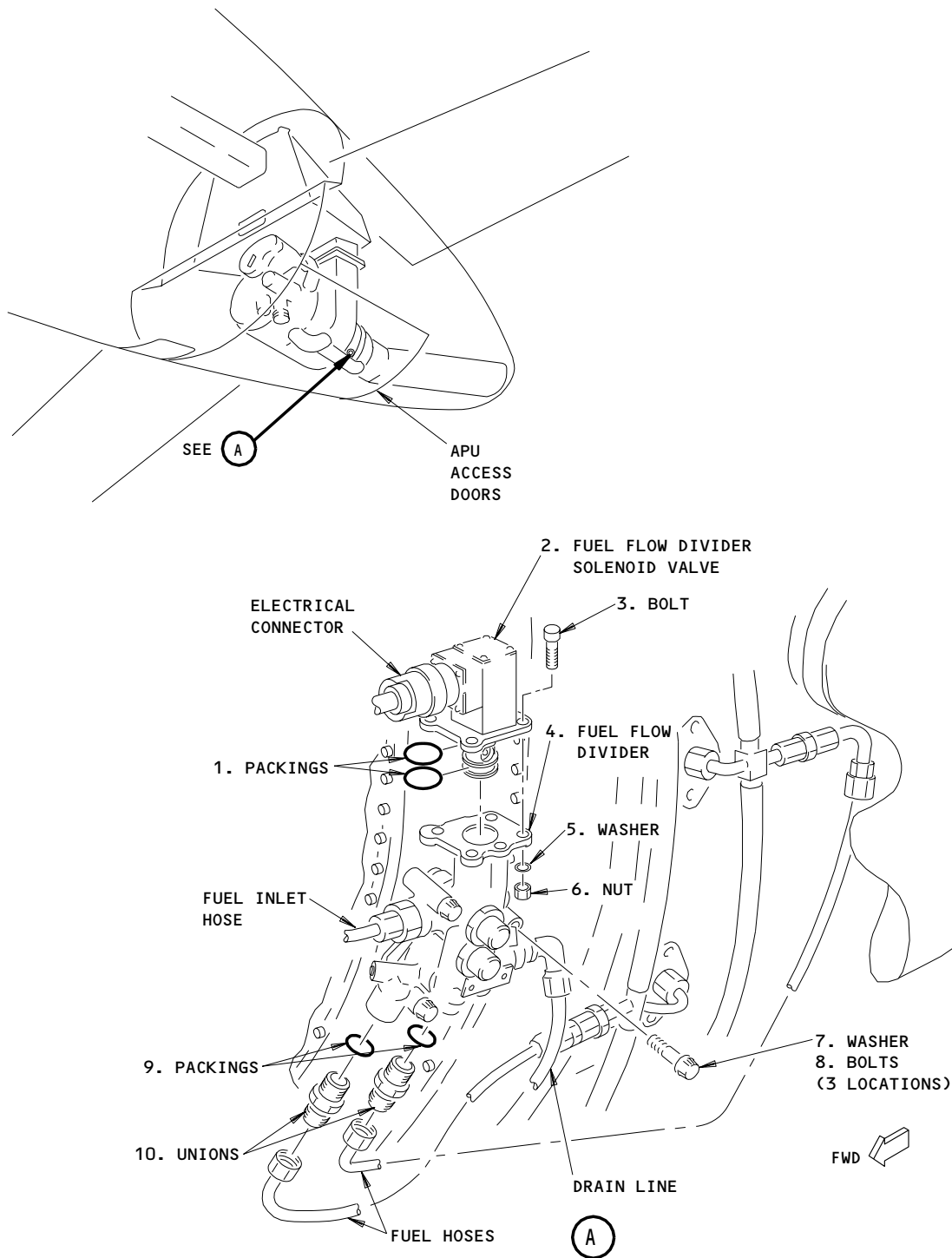
EFFECTIVITY

ALL

49-31-03

01

Page 401  
Aug 22/01



Fuel Flow Divider and Solenoid Valve Installation  
Figure 401

EFFECTIVITY

ALL

49-31-03

02

Page 402  
Dec 10/98

- (c) Remove the solenoid valve (2) from the fuel flow divider (4).
- (d) Remove the packings (1) from the solenoid valve (2).
  - 1) Discard the packings (1).

TASK 49-31-03-404-006

3. Solenoid Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Packing	49-31-03	01	95
	2	Fuel Flow Divider Solenoid Valve			90

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 424-007

(1) Install the solenoid valve:

- (a) Lubricate the new packings (1) with a light coat of lubricant.
- (b) Install the packings (1) on the solenoid valve (2).

EFFECTIVITY

ALL

**49-31-03**

01

Page 403  
Aug 22/05

- (c) Install the solenoid valve (2) on the fuel flow divider (4) with the four bolts (3), washers (5), and the nuts (6).
  - 1) Tighten the nuts (6) to 40-50 inch-pounds (4.5-5.7 newton-meters).
- (d) Connect the electrical connector to the solenoid valve (2).
- (e) Install a lockwire on the electrical connector.

S 414-008

- (2) Install the fuel flow divider (Ref par. 5).

TASK 49-31-03-004-015

4. Fuel Flow Divider Removal (Fig. 401)

A. Standard Tools and Equipment

- (1) Container - 1 U.S. Gallon (4 Liter) capacity, for fuel

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 864-014

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-020

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-31-03

01

Page 404  
Aug 22/01

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-021

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 034-024

- (4) Disconnect the electrical connector from the solenoid valve.

S 024-016

- (5) Remove the fuel flow divider:

- (a) Put the container below the fuel flow divider (4).
  - (b) Disconnect the drain line and the fuel inlet line from the fuel flow divider (4).
  - (c) Disconnect the fuel hoses from the bottom of the fuel flow divider (4).
  - (d) Install caps on the drain line and the fuel hoses for protection.
  - (e) Let the fuel fully drain from the fuel flow divider (4).
  - (f) Remove the bolts (8) and the washers (7) that attach the fuel flow divider (4) to the APU.
  - (g) Remove the unions (10) and the packings (9) from the fuel flow divider (4).
    - 1) Discard the packings (9).

EFFECTIVITY

ALL

49-31-03

04

Page 405  
Aug 22/01

S 034-022

- (6) If the fuel flow divider and the solenoid valve are not to be replaced as an assembly, remove the solenoid valve (Ref par. 2).

TASK 49-31-03-404-017

5. Fuel Flow Divider Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or  
(2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4 9	Fuel Flow Divider Packing	49-31-03	01	60 155

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit  
(2) AMM 49-61-05/201, APU Control Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

E. Procedure

S 434-023

- (1) If the solenoid valve is not installed on the fuel flow divider, install the solenoid valve (Ref par. 3).

S 424-018

- (2) Install the fuel flow divider:  
(a) Lubricate the new packings (9) with a light coat of lubricant.  
(b) Install the packings (9) on the unions (10).  
(c) Install the unions (10) in the fuel flow divider (4).  
(d) Put the fuel flow divider (4) in its position on the APU.

EFFECTIVITY

ALL

49-31-03

01

Page 406  
Aug 22/05



- (e) Install the washers (7) and the bolts (8) that attach the fuel flow divider (4) to the APU.
  - 1) Tighten the bolts (8) to 50 inch-pounds (5.7 newton-meters).
- (f) Remove the caps from the three fuel hoses and the drain line.

**CAUTION:** DO NOT LET THE FUEL LINES TWIST WHILE YOU TIGHTEN THE NUTS. DAMAGE TO THE FUEL LINES CAN OCCUR. THIS CAN CAUSE FUEL LEAKAGE OR A SUPPLY OF FUEL THAT IS NOT SUFFICIENT TO THE APU.

- (g) Connect the fuel hoses to the bottom of the fuel flow divider (4).
  - 1) Tighten the fuel hoses to 100-120 inch-pounds (11.3-13.6 newton-meters).
- (h) Connect the fuel inlet hose and the drain line to the fuel flow divider (4).

S 434-019

- (3) Connect the electrical connector to the solenoid valve.
  - (a) Install a lockwire on the electrical connector.

S 744-025

- (4) Do the BITE test for the APU system (Ref 49-61-05/201).

S 864-026

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-027

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 794-028

- (7) Do a leakage check for the fuel flow divider:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).

EFFECTIVITY

ALL

**49-31-03**

04

Page 407  
Aug 22/01

- (b) During the APU operation, examine the fuel flow divider and the solenoid valve for leakage.
- (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- (d) If you found leakage, repair the cause of it.

S 414-029

- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-31-03

01

Page 408  
Aug 22/01

FUEL FILTER ELEMENT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the fuel filter element for the APU.
- B. The fuel filter is on the fuel control unit. The fuel control unit is on the APU gearbox below the APU starter motor.
- C. You can get access to the fuel filter element through the APU access doors.

TASK 49-31-04-004-001

2. APU Fuel Filter Element Removal (Fig. 401)

A. Equipment

- (1) Container – Fuel Resistant, 1 Gallon (4 Liters)

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

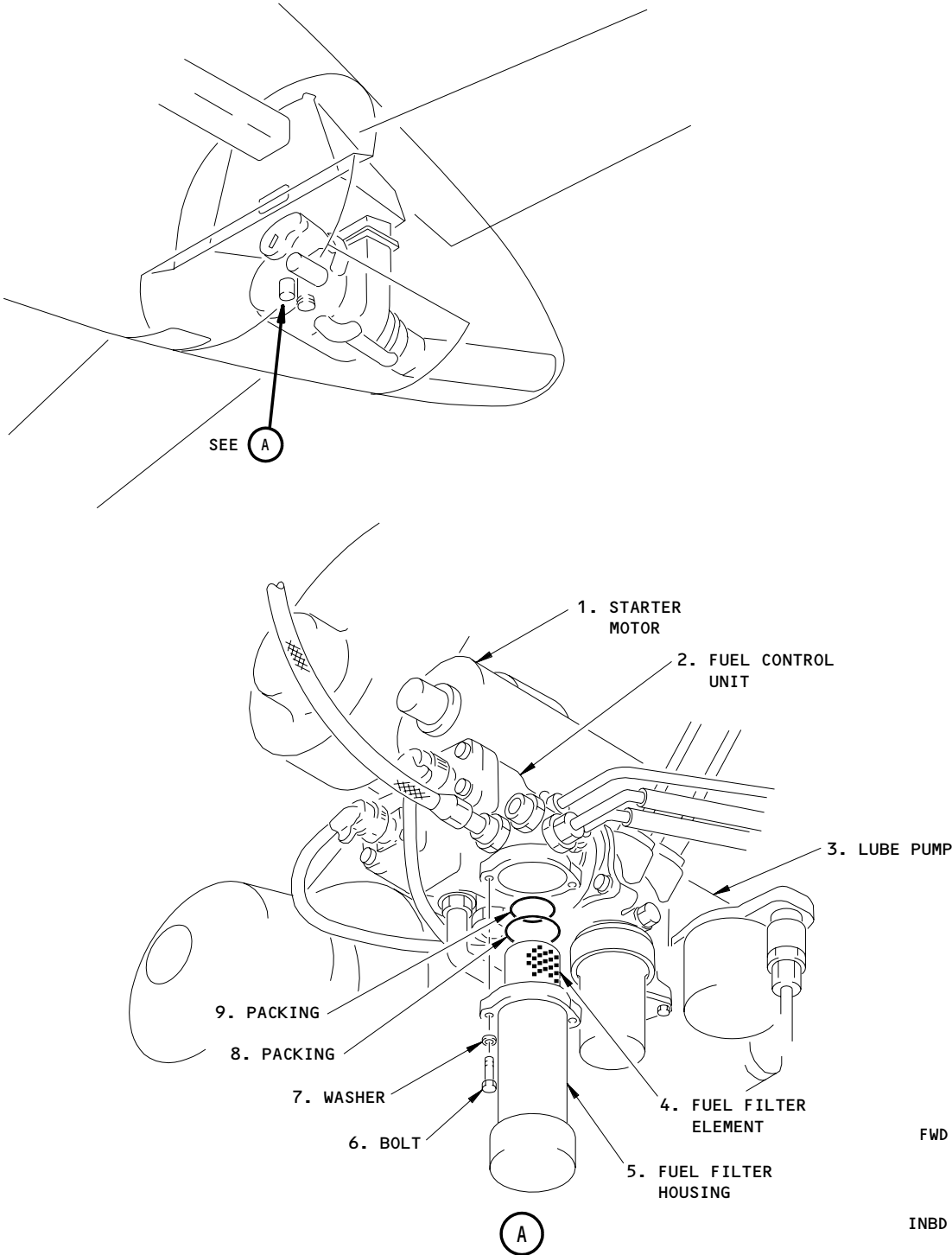
EFFECTIVITY

ALL

49-31-04

01

Page 401  
Dec 22/03



APU Fuel Filter Element Installation  
Figure 401

EFFECTIVITY	
	ALL

49-31-04

01

Page 402  
Dec 22/07

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the fuel filter element:

- (a) Put the container below the fuel filter housing (5).
- (b) Loosen the two bolts (6) and the washers (7) that attach the fuel filter housing (5) to the fuel control unit (2).
- (c) Turn the fuel filter housing (5) counterclockwise and remove it from the fuel control unit (2).
- (d) Remove the packings (8 and 9) and the fuel filter element (4) from the fuel filter housing (5).
- (e) Discard the fuel filter element (4) and the packings (8 and 9).

EFFECTIVITY

ALL

49-31-04

03

Page 403  
Dec 22/03

(f) Remove the container.

TASK 49-31-04-404-006

3. APU Fuel Filter Element Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Fuel Filter Element	49-31-00	01	90
	8	Packing			85
	9	Packing			95

C. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

(1) Install the fuel filter element:

- (a) Lubricate the new packings (8 and 9) with a light coat of lubricant.

**CAUTION:** DO NOT REMOVE THE COVER THAT HAS HOLES FROM THE FUEL FILTER ELEMENT. THE COVER IS A PART OF THE FUEL FILTER ELEMENT. A FAILURE OF THE FUEL FILTER CAN OCCUR IF YOU REMOVE THE COVER.

- (b) Install the new fuel filter element (4) and the packing (9) in the fuel filter housing (5).
- (c) Install the packing (8) on the fuel filter housing (5).

EFFECTIVITY

ALL

49-31-04

01

Page 404  
Aug 22/05

- (d) Put the fuel filter housing (5) on the fuel control unit (2) and turn it clockwise until the slots engage the bolts (6).

NOTE: The washers (7) must be between the bolts and the fuel filter housing.

- (e) Tighten the bolts (6) to 50-52 inch-pounds (5.7-5.9 newton-meters).

S 864-008

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-010

- (4) Do a leakage test for the fuel filter element:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel filter housing for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-31-04

03

Page 405  
Dec 22/03

FUEL FILTER ELEMENT - INSPECTION/CHECK

1. General

- A. This procedure contains the inspection task for the fuel filter element for the APU.
- B. The fuel filter element is on the fuel control unit. The fuel control unit is on the APU gearbox below the APU starter motor. You can get access to the fuel control unit and fuel filter element through the APU access door.

TASK 49-31-04-206-015

2. Fuel Filter Element Inspection (Fig. 601)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-31-04/401, Fuel Filter Element
- (3) AMM 49-31-07/201, High Pressure Fuel Filter
- (4) AMM 49-31-08/201, Fuel Divider Filter Element
- (5) AMM 49-31-10/401, Fuel Filter Differential Pressure Indicator

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 866-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

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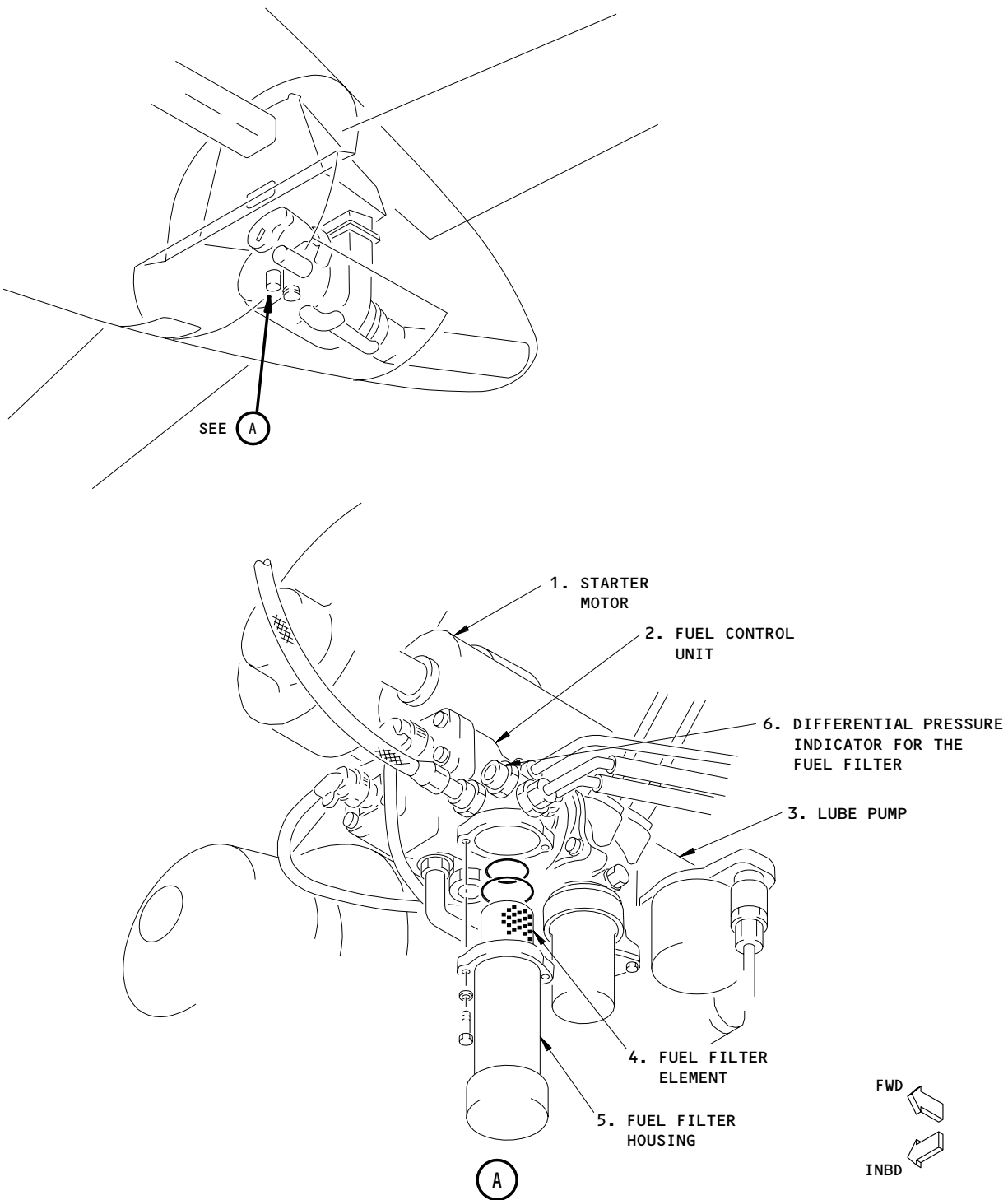
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49-31-04

01

Page 601  
Apr 22/04





APU Fuel Filter Element Inspection  
Figure 601

EFFECTIVITY	
	ALL

49-31-04

01

Page 602  
Dec 22/07

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 016-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-012

- (4) Do the visual inspection of the differential pressure indicator (6) for the fuel filter.

- (a) Look at the differential pressure indicator (6) for the fuel filter.

- (b) If the differential pressure indicator (6) is not pushed out, then do the steps below in the Put the Airplane Back to Its Usual Condition.

NOTE: The fuel filter element is OK and the APU can be returned to service.

- (c) If the differential pressure indicator (6) is pushed out, then push it in and continue.

- (d) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- 1) P49 APU Auxiliary Panel
  - a) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-31-04

04

Page 603  
Dec 22/07

- b) 49C3, APU START
- 2) P11 Overhead Panel
  - a) 11B35, APU ALTN CONT
- (e) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.
- (f) Start the APU (AMM 49-11-00/201) and operate at 100% RPM.
- (g) Do the APU shutdown procedure (AMM 49-11-00/201).
- (h) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.
- (i) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - 1) P49 APU Auxiliary Panel
    - a) 49C2, APU PRIME CONT
    - b) 49C3, APU START
  - 2) P11 Overhead Panel
    - a) 11B35, APU ALTN CONT
- (j) Look at the differential pressure indicator (6).
- (k) If the differential pressure indicator (6) is not pushed out, replace it (AMM 49-31-10/401).
- (l) If the indicator (6) is pushed out, do an inspection of the element (4) for the fuel filter:

**NOTE:** This is an indication that the differential pressure is more than the limit and the fuel filter has blockage.

- 1) Remove the fuel filter element (AMM 49-31-04/401).
- 2) Examine the filter element (4) for contamination.
- 3) Install a new fuel filter element (AMM 49-31-04/401).
- 4) If you saw contamination on the fuel filter element, do these steps:
  - a) Do the inspection of the high pressure fuel filter (AMM 49-31-07/201).
  - b) Do the inspection of the filter element for the fuel flow divider (AMM 49-31-08/201).

D. Put the Airplane Back to Its Usual Condition

S 416-011

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-31-04

04

Page 604  
Dec 22/07

S 866-013

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 866-014

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

**49-31-04**

04

Page 605  
Dec 22/07

FUEL FILTER BYPASS VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the bypass valve for the APU fuel filter.
- B. The bypass valve is on the fuel control unit. The fuel control unit is on the APU gearbox below the starter motor.
- C. You can get access to the bypass valve through the APU access doors.

TASK 49-31-05-004-001

2. Fuel Filter Bypass Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach the DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

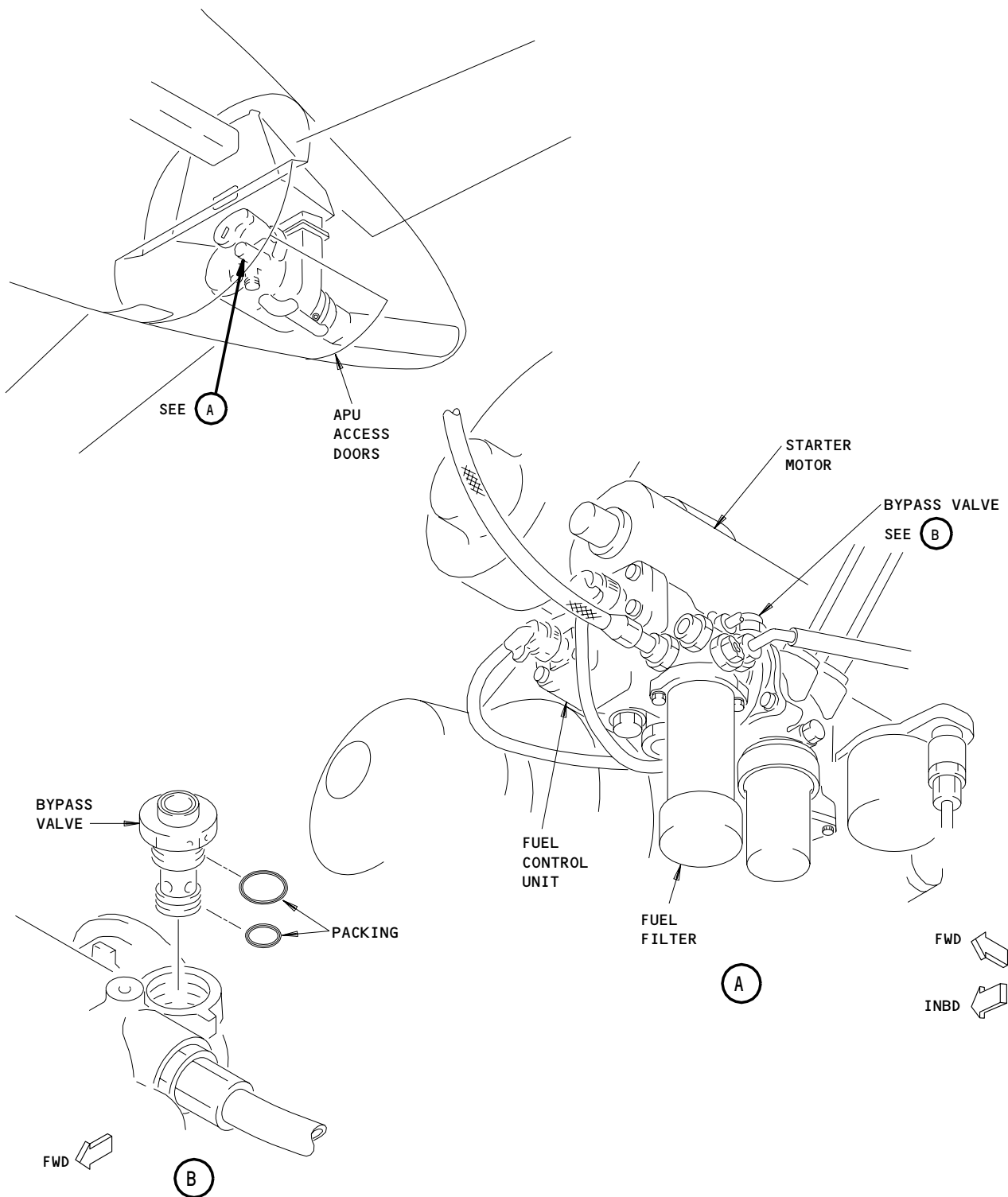
EFFECTIVITY

ALL

**49-31-05**

03

Page 401  
Aug 22/01



Fuel Filter Bypass Valve Installation  
Figure 401

EFFECTIVITY

ALL

49-31-05

01

Page 402  
May 10/91

8860

2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the bypass valve for the fuel filter:

(a) Remove the bypass valve from the fuel control unit.

(b) Remove and discard the packings from the bypass valve.

TASK 49-31-05-404-006

3. Fuel Filter Bypass Valve Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or

EFFECTIVITY

ALL

49-31-05

03

Page 403  
Aug 22/01

(2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. References

(1) AMM 49-11-00/201, Auxiliary Power Unit

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Fuel Filter Bypass Valve Packing Packing	49-31-05	01	55 60 65

D. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the bypass valve for the fuel filter:
- (a) Lubricate the new packings with a light coat of lubricant.
  - (b) Install the packings on the bypass valve.
  - (c) Install the bypass valve in the fuel control unit.
    - 1) Tighten the bypass valve to 105-115 inch-pounds (11.9-13.0 newton-meters).
  - (d) Install a lockwire on the bypass valve.

S 864-008

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-31-05

04

Page 404  
Aug 22/05



S 794-010

- (4) Do a leakage test for the bypass valve:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the bypass valve for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-31-05

01

Page 405  
Aug 22/05

FUEL MANIFOLDS AND NOZZLES – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the APU fuel manifolds and the fuel nozzles.
- B. The fuel manifolds and the fuel nozzles are on the combustor housing of the APU. You can get access to the manifolds and the nozzles through the APU access doors.

TASK 49-31-06-004-001

2. Fuel Manifolds and Nozzles Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

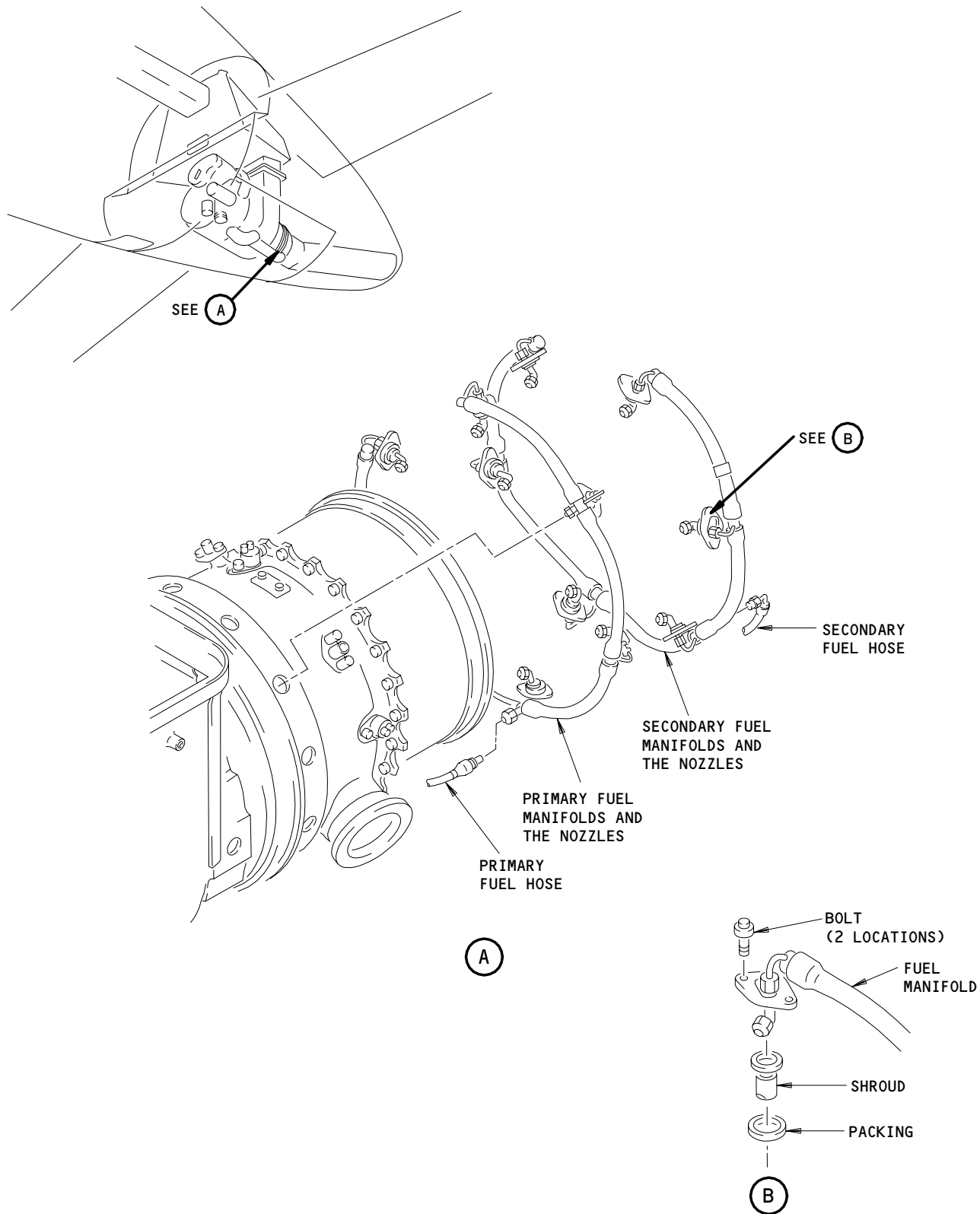
EFFECTIVITY

ALL

49-31-06

04

Page 401  
Aug 22/01



Fuel Manifolds and Nozzles Installation  
Figure 401

EFFECTIVITY	
	ALL

49-31-06

2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the fuel manifolds and the fuel nozzles:

(a) Disconnect the primary fuel hoses from the primary fuel manifolds.

(b) Disconnect the secondary fuel hose from the secondary fuel manifolds.

(c) Install caps on all the fuel hoses and the fuel manifolds for protection.

(d) Remove all the bolts that attach the fuel manifolds and the fuel nozzles to the combustor case.

(e) Remove the fuel manifolds, the nozzle assemblies, the shrouds, and the packings from the APU.

1) Discard the packings.

TASK 49-31-06-404-006

3. Fuel Manifolds and Nozzles Installation (Fig. 401)

EFFECTIVITY

ALL

49-31-06

03

Page 403  
Dec 22/08

- A. Consumable Materials  
 (1) D00010 Compound - Antiseize, MIL-A-907, Fel-Pro C5-A
- B. References  
 (1) AMM 49-11-00/201, Auxiliary Power Unit
- C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Fuel Manifold and Nozzle Assembly (Primary)	49-31-06	02	55
		Fuel Manifold and Nozzle Assembly (Secondary)			85
		Packing	49-31-00	01	280

- D. Access
- (1) Location Zones
- 154 Aft Cargo Compartment - Right
  - 211 Flight Compartment - Left
  - 212 Flight Compartment - Right
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right

- (2) Access Panels
- 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the fuel manifolds and the fuel nozzles:
- (a) Install the new packings on the shrouds.
  - (b) Install the shrouds on the fuel nozzles.
  - (c) Install the fuel manifolds and the nozzle assemblies in the engine.
  - (d) Apply a layer of the antiseize compound on the bolts.
  - (e) Install the bolts that attach the fuel nozzles to the APU.
    - 1) Tighten the bolts to 60-65 inch-pounds (6.8-7.3 newton-meters).
  - (f) Install lockwires on the bolts.
  - (g) Remove the caps from the fuel hoses and the fuel manifolds.
  - (h) Connect all the fuel hoses to the fuel manifolds.
    - 1) Tighten the fuel hoses to 120-135 inch-pounds (13.6-15.3 newton-meters).

EFFECTIVITY

ALL

49-31-06

03

Page 404  
Dec 22/08

S 864-008

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-010

- (4) Do a leakage test for the fuel manifolds and the fuel nozzles:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel manifolds and the fuel nozzles for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-31-06

03

Page 405  
Aug 22/05

HIGH PRESSURE FUEL FILTER – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these four tasks:
  - (1) High Pressure Fuel Filter Removal
  - (2) High Pressure Fuel Filter Installation
  - (3) High Pressure Fuel Filter Inspection
  - (4) Clean the High Pressure Fuel Filter.
- B. The filter for the high pressure fuel is installed in the fuel control unit. The fuel control unit is on the APU gearbox below the starter motor.
- C. You can get access to the filter for the high pressure fuel through the APU access doors.

TASK 49-31-07-002-001

2. High Pressure Fuel Filter Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

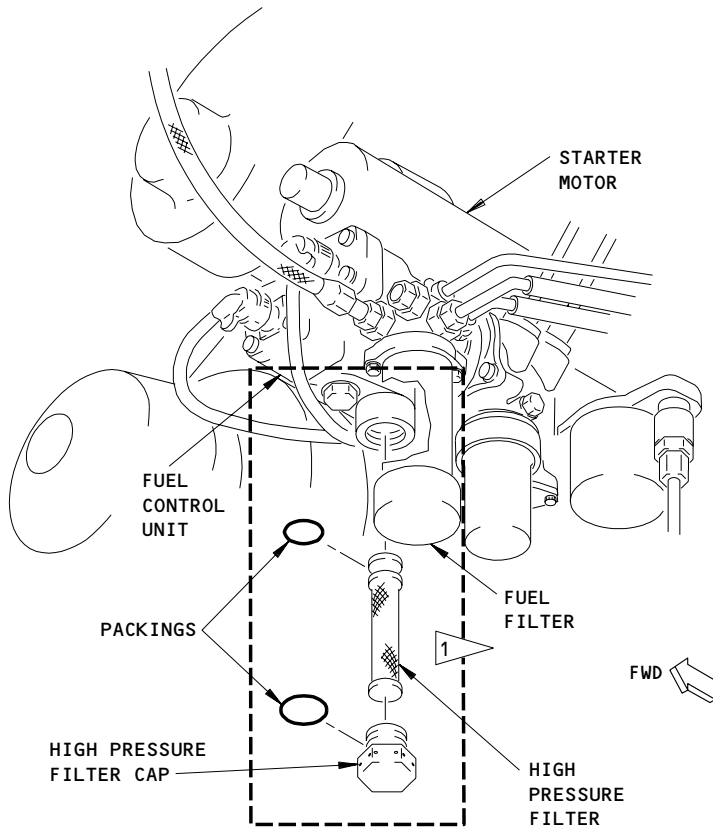
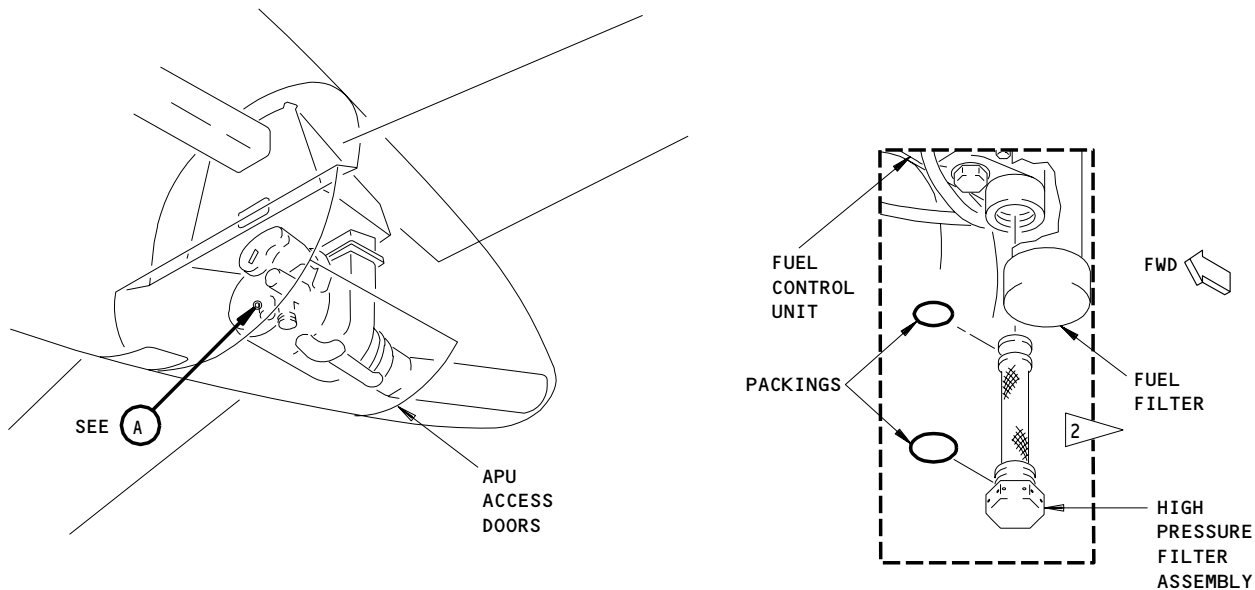
EFFECTIVITY

ALL

49-31-07

01

Page 201  
Aug 22/01



- 1 APUs WITH GARRETT SB 49-7156
- 2 APUs WITHOUT GARRETT SB 49-7156

(A)

High Pressure Fuel Filter - Maintenance Practices  
Figure 201

EFFECTIVITY

ALL

49-31-07

01

Page 202  
Nov 10/97



- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 012-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 022-005

- (4) Remove the filter for the high pressure fuel:

- (a) APU POST-ALLIEDSIGNAL SB 49-7156;

Do these steps:

- 1) Install a 10-32 screw in the threaded hole in the plug.
    - 2) Remove the high pressure filter and packings from the fuel control unit.
    - 3) Remove the 10-32 screw from the plug and discard the packings.

- (b) APU PRE-ALLIEDSIGNAL SB 49-7156;

Do these steps:

- 1) Remove the high pressure filter and the packings from the fuel control unit.
    - 2) Discard the packings.

TASK 49-31-07-402-006

3. High Pressure Fuel Filter Installation (Fig. 201)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or

EFFECTIVITY

ALL

49-31-07

04

Page 203  
Aug 22/01

(2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. References

(1) AMM 49-11-00/201, Auxiliary Power Unit

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201		High Pressure Fuel Filter Packing Packing	49-31-00	01	146 or 146A 147 148

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 422-007

(1) Install the filter for the high pressure fuel:

(a) APU POST-ALLIEDSIGNAL SB 49-7156;

Do these steps:

- 1) Lubricate the new packings with a light coat of lubricant.
- 2) Install the packings on the high pressure filter and the plug.
- 3) Install the high pressure filter and the plug in the fuel control unit.
  - a) Tighten the plug to 25-27 inch-pounds (2.8-3.1 newton-meters).
- 4) Install a lockwire on the plug.

(b) APU PRE-ALLIEDSIGNAL SB 49-7156;

Do these steps:

- 1) Lubricate the new packings with a light coat of lubricant.
- 2) Install the packings on the high pressure filter.
- 3) Install the high pressure filter in the fuel control unit.
  - a) Tighten the high pressure filter to 25-27 inch-pounds (2.8-3.1 newton-meters).
- 4) Install a lockwire on the high pressure filter.

EFFECTIVITY

ALL

49-31-07

01

Page 204  
Aug 22/05

S 862-008

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 862-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 792-010

- (4) Do a leakage test on the installation of the high pressure filter:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel control unit for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 412-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

TASK 49-31-07-202-012

4. High Pressure Fuel Filter Inspection

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

EFFECTIVITY

ALL

49-31-07

03

Page 205  
Aug 22/05

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

**B. Procedure**

S 012-013

- (1) Remove the filter for the high pressure fuel (Ref par. 2).

S 212-014

- (2) Visually examine the filter for the high pressure fuel:
  - (a) Examine the high pressure filter for cracks, torn areas, and deformation.
  - (b) Examine the openings of the high pressure filter for blockage.
  - (c) Examine the high pressure filter for too much finish.
  - (d) Replace the high pressure filter if it is defective.

S 412-015

- (3) Install the filter for the high pressure fuel (Ref par. 3).

TASK 49-31-07-102-016

**5. Clean the High Pressure Fuel Filter (Fig. 202)**

**A. Standard Tools and Equipment**

- (1) Container - 1 U.S. Gallon (4 Liter) capacity, for solutions (3 are necessary)
- (2) Beaker - Sufficiently large to hold the high pressure filter
- (3) Compressed Air Source - 30 psig maximum
- (4) Ultrasonic Sump
- (5) Air Pressure Regulator - 0-30 psig
- (6) Air Pressure Gage - 0-30 psig (two are necessary)
- (7) Restrictor Unit - 0.042 inch diameter orifice

**B. Consumable Materials**

- (1) B00074 Solvent - Degreasing, MIL-PRF-680 (Supersedes P-D-680)
- (2) B00096 Cleaner - Dowclene EC
- (3) B00549 Electrocleaner - Wyandotte FS
- (4) E00116 Stripper - Rust Stripper, Oakite
- (5) G00016 Acid - Hydrochloric, MIL-L-13528

**C. Access**

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

EFFECTIVITY

ALL

**49-31-07**

01

Page 206  
Dec 22/07

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

D. Procedure

S 012-017

- (1) Remove the filter for the high pressure fuel (Ref par. 2).

S 112-018

**WARNING:** MAKE SURE YOU CLEAN THE FILTER ELEMENT IN A CLEAN AREA THAT HAS A GOOD FLOW OF AIR. MAKE SURE YOU HAVE FIRE EXTINGUISHERS AND CONTAINER COVERS NEAR YOU WHILE YOU DO THIS TASK. THE FUMES FROM THE SOLVENTS AND THE CLEANERS CAN CAUSE INJURY TO PERSONS.

- (2) Clean the filter element with the solvent (MIL-PRF-680):

**NOTE:** To use the filter temporarily, you can clean the element in the rust stripper solution and dry it with the compressed air. But, you must do the steps that follow to fully clean the filter element.

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, HEAT, AND FLAME. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (a) Make sure the solvent is cold.
- (b) Clean the filter element in the cold solvent.

S 152-019

- (3) Remove the rust from the filter element:
  - (a) Prepare a solution of the rust stripper:
    - 1) Mix 3-5 pounds (1.4-2.3 kilograms) of the rust stripper with each gallon (4 liters) of water.
    - 2) Keep the solution at a temperature of 72°-82°C (162°-180°F).
    - 3) Use the compressed air to keep the solution fully mixed.
  - (b) Soak the filter element in the solution for 30 minutes.
  - (c) Remove the filter element from the solution.
  - (d) Fully flush the filter element with clean water.

EFFECTIVITY

ALL

49-31-07

01

Page 207  
Dec 22/07

S 112-020

- (4) Clean the filter element with electrocleaner:
- (a) Prepare a solution of the electrocleaner:
    - 1) Mix 9 ounces (255 grams) of the electrocleaner to each gallon (4 liters) of water.
    - 2) Keep the solution at a temperature of 72°-93°C (160°-200°F).
  - (b) Soak the filter element in the solution for 4-6 minutes.

NOTE: During this time, the filter element will be a positive voltage source for 1-2 minutes with a voltage of 4-7 volts dc.

- (c) Flush the filter element with cold faucet water.

S 112-021

- (5) Clean the filter element with the hydrochloric acid:
- (a) Mix equal quantities of the hydrochloric acid and water in a container.
  - (b) Soak the filter element in the solution at a temperature of 70°-75°F (21°-24°C) for 30-60 seconds.
  - (c) Flush the filter element with cold faucet water.

S 112-022

- (6) Soak the filter element in the electrocleaner solution prepared in step 4.(a) for 4-6 minutes.
- (a) Flush the filter with cold faucet water.

S 172-023

- (7) Flush the inner areas and the outer areas of the filter element with clean, pressurized water.

S 132-024

- (8) Clean the filter element in the ultrasonic cleaner:
- (a) Put the filter element in the beaker with the open end pointed down.
  - (b) Fill the beaker with the cleaner.
  - (c) Put the beaker in the ultrasonic cleaner tank.
  - (d) Fill the ultrasonic cleaner tank with water until the water level is 3/8 inch (10 mm) from the top of the tank.
  - (e) Operate the ultrasonic cleaner for 5 minutes.
  - (f) Remove the beaker from the ultrasonic cleaner tank.
  - (g) Discard the dirty cleaner.
  - (h) Use a plastic bottle to flush the filter element and the beaker with the clean cleaner.
  - (i) Fill the beaker with the clean cleaner.
  - (j) Put the beaker in the ultrasonic cleaner tank.
  - (k) Operate the ultrasonic cleaner for 5 minutes.
  - (l) Continue to do steps (f)-(k) until the cleaner stays clean after the 5 minute ultrasonic cleaner operation.

EFFECTIVITY

ALL

49-31-07

01

Page 208  
Aug 22/05

S 172-025

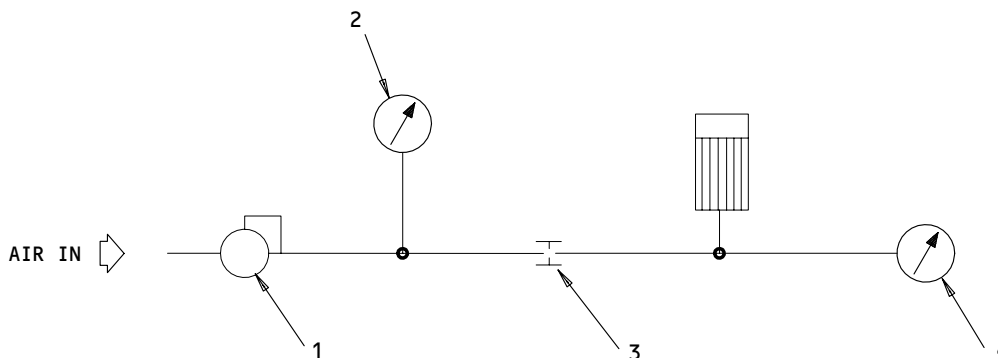
- (9) Flush the filter element:
- (a) Remove the filter element from the beaker.
  - (b) Flush the inner areas and the outer areas of the filter element with clean, pressurized water.
  - (c) Dry the filter element with the compressed air source.

S 782-026

- (10) Do a pressure check of the cleaned filter element (Fig. 202):

**NOTE:** Use the pressure check data of a new element to compare with the data of the cleaned element.

- (a) Install the filter element in a test fixture equivalent to the one shown in Fig. 202.
- (b) Adjust the regulator (1) until the inlet pressure gage (2) shows an inlet air pressure of 20 psig.
- (c) Examine the pressure indication on the downstream pressure gage (4).
  - 1) Make sure the pressure on the downstream pressure gage (4) is not less than 15 psig.
- (d) Replace the filter element if the downstream pressure is too low.



- |   |  |
|---|--|
| <ol style="list-style-type: none"> <li>1. AIR PRESSURE REGULATOR<br/>(0 TO 30 PSIG)</li> <li>2. INLET PRESSURE GAGE<br/>(0 TO 30 PSIG)</li> </ol> | <ol style="list-style-type: none"> <li>3. RESTRICTOR UNIT<br/>(0.042 INCH DIAMETER ORIFICE)</li> <li>4. DOWNSTREAM PRESSURE<br/>GAGE (0 TO 30 PSIG)</li> </ol> |
|---|--|

Filter Element Pressure Drop Check  
Figure 202

EFFECTIVITY	ALL
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49-31-07

01

Page 209  
Aug 22/05

 **BOEING**  
767  
MAINTENANCE MANUAL

S 552-027

- (11) If the cleaned filter element is not to be installed immediately, keep the element in a clean dry container.

S 412-028

- (12) Install the filter for the high pressure fuel (Ref par. 3).

EFFECTIVITY

ALL

**49-31-07**

01

Page 210  
Aug 22/05



FUEL FLOW DIVIDER FILTER ELEMENT – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these four tasks:
  - (1) Fuel Flow Divider Filter Element Removal
  - (2) Fuel Flow Divider Filter Element Installation
  - (3) Fuel Flow Divider Filter Element Inspection
  - (4) Clean the Fuel Flow Divider Filter Element.
- B. The filter element for the fuel flow divider is in the fuel flow divider. The fuel flow divider is on the aft bottom section of the APU.
- C. You can get access to the fuel flow divider through the APU access doors.

TASK 49-31-08-002-001

2. Fuel Flow Divider Filter Element Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

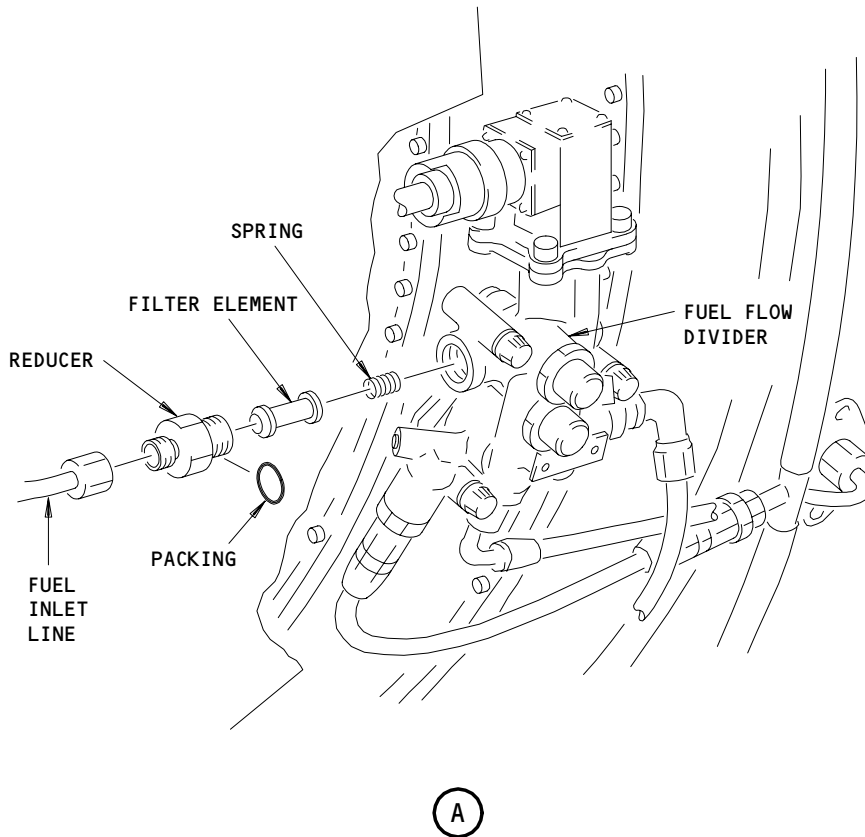
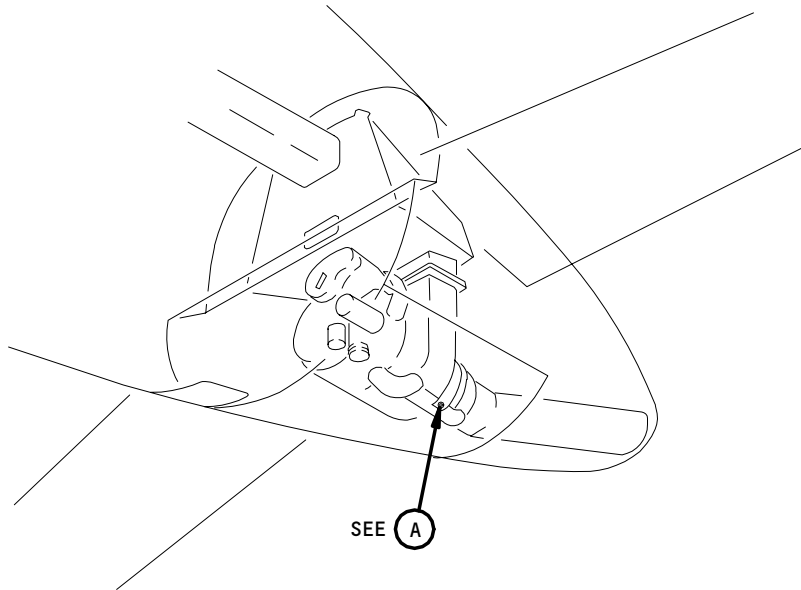
EFFECTIVITY

ALL

49-31-08

01

Page 201  
Aug 22/01



Fuel Flow Divider Filter Element Installation  
Figure 201

EFFECTIVITY	
	ALL

49-31-08

01

Page 202  
May 10/91

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 012-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 022-005

- (4) Remove the filter element for the fuel flow divider:
  - (a) Disconnect the fuel inlet line from the reducer.
  - (b) Remove the reducer and the packing from the fuel flow divider.
    - 1) Discard the packing.
  - (c) Remove the filter element and the spring from the fuel flow divider.

TASK 49-31-08-402-006

3. Fuel Flow Divider Filter Element Installation (Fig. 201)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or

EFFECTIVITY

ALL

**49-31-08**

04

Page 203  
Aug 22/01

- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236
- B. References
  - (1) AMM 49-11-00/201, Auxiliary Power Unit
- C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201		Fuel Flow Divider Filter Element Packing	49-31-03	01	110 105

- D. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

- S 422-007
  - (1) Install the filter element for the fuel flow divider:
    - (a) Install the spring and the filter element in the fuel flow divider.
    - (b) Lubricate the new packing with a light coat of lubricant.
    - (c) Install the packing on the reducer.
    - (d) Install the reducer in the fuel flow divider.
      - 1) Tighten the reducer to 75-80 inch-pounds (8.5-9.0 newton-meters).
    - (e) Connect the fuel inlet line to the reducer.

- S 862-008
  - (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
    - (a) P49 APU Auxiliary Panel
      - 1) 49C2, APU PRIME CONT
      - 2) 49C3, APU START
    - (b) P11 Overhead Panel
      - 1) 11B35, APU ALTN CONT

- S 862-009
  - (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-31-08

04

Page 204  
Aug 22/05

S 792-010

- (4) Do a leakage test of the filter element installation:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel flow divider for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 412-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

TASK 49-31-08-202-012

4. Fuel Flow Divider Filter Element Inspection

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 012-013

- (1) Remove the filter element for the fuel flow divider (Ref par. 2).

S 212-014

- (2) Visually examine the filter element for the fuel flow divider:
- (a) Examine the filter element for cracks, torn areas, and deformation.
  - (b) Examine the reducer for cracks, gouges, and damaged threads.
  - (c) Replace the filter element or the reducer if they have damage.

EFFECTIVITY

ALL

49-31-08

01

Page 205  
Aug 22/05

S 412-015

- (3) Install the filter element for the fuel flow divider.

TASK 49-31-08-102-016

5. Clean the Fuel Flow Divider Filter Element

A. Standard Tools and Equipment

- (1) Compressed Air Source - 30 psig maximum

B. Consumable Materials

- (1) E00116 Stripper - Rust Stripper, Oakite

C. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |
| 822   | Aft Cargo Door          |

D. Procedure

S 012-017

- (1) Remove the filter element for the fuel flow divider (Ref par. 2).

S 112-018

- (2) Clean the filter element for the fuel flow divider:

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, HEAT, AND FLAME. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

(a) Prepare a solution of the rust stripper:

- 1) Mix 3-5 pounds (1.4-2.3 kilograms) of the rust stripper with each gallon (4 liters) of water.
- 2) Keep the solution at a temperature of 72°-82°C (162°-180°F).
- 3) Use the air source to keep the solution fully mixed.

(b) Soak the filter element in the solution for 5 minutes.

(c) Remove the filter element from the solution and brush the element to remove the rust.

(d) Flush the filter element with warm, soapy water.

(e) Fully flush the filter element with clean water.

(f) Dry the filter element with the compressed air.

EFFECTIVITY

ALL

49-31-08

01

Page 206  
Aug 22/05

(g) If it is necessary, do steps (a) and (b) again until the filter element is clean.

S 412-019

(3) Install the filter element for the fuel flow divider (Ref par. 3).

EFFECTIVITY

ALL

**49-31-08**

01

Page 207  
Aug 22/05

FUEL MANIFOLD HOSES – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the fuel manifold hoses for the APU.
- B. The fuel manifold hoses connect the fuel flow divider to the APU fuel manifolds. The APU fuel manifolds are on the aft section of the APU, around the compressor case.
- C. You can get access to the fuel manifold hoses through the APU access doors.

TASK 49-31-09-004-001

2. Fuel Manifold Hoses Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

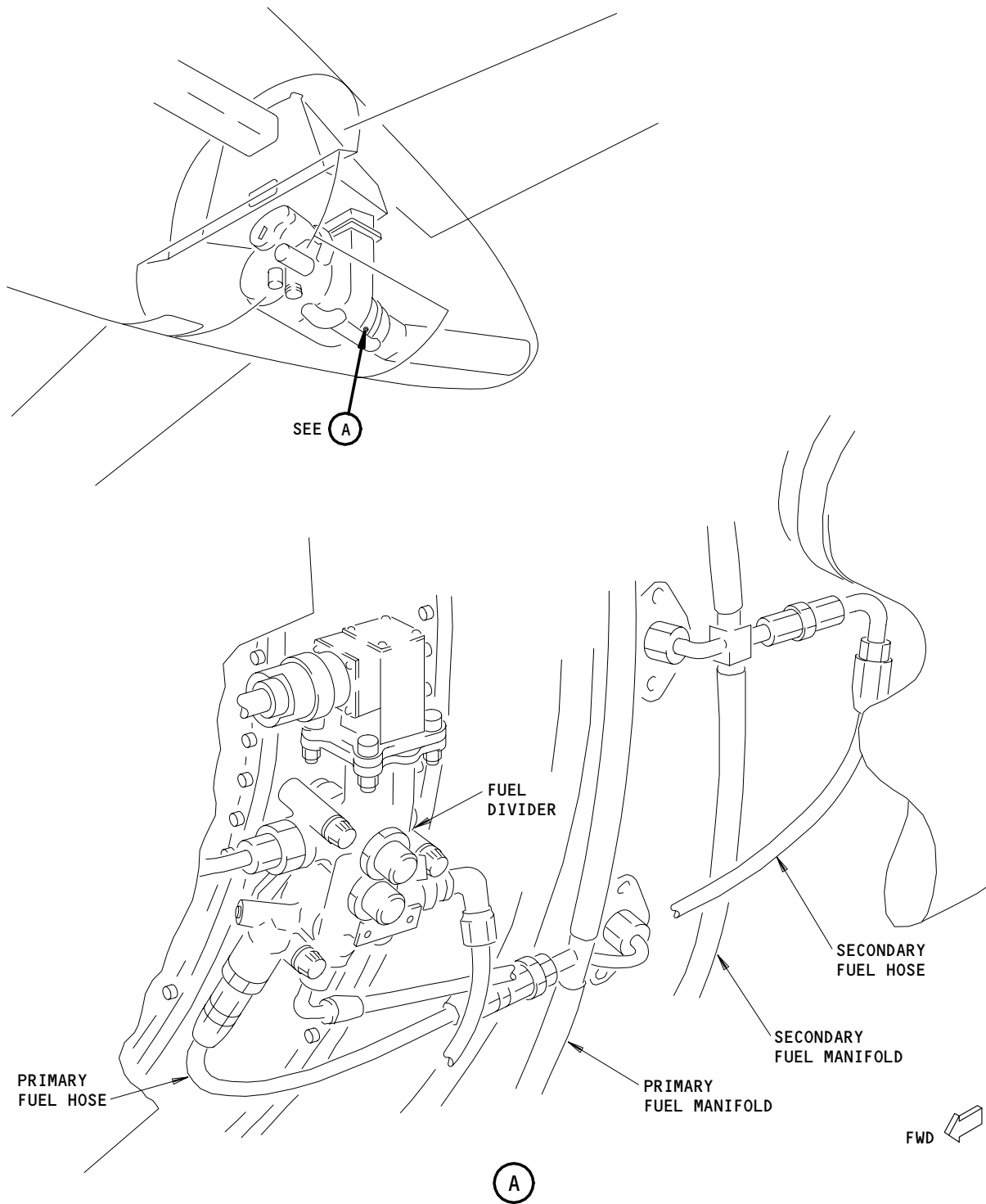
ALL

49-31-09

01

Page 401  
Aug 22/01





Fuel Manifold Hoses Installation  
Figure 401

EFFECTIVITY	
	ALL

49-31-09

01

Page 402  
May 10/91

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the fuel manifold hoses:
  - (a) Disconnect the primary fuel hose and the secondary fuel hose from the fuel manifolds.
  - (b) Disconnect the primary fuel hose and the secondary fuel hose from the fuel flow divider.
  - (c) Remove the fuel manifold hoses.

TASK 49-31-09-404-006

3. Fuel Manifold Hoses Installation (Fig. 401)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

EFFECTIVITY

ALL

49-31-09

03

Page 403  
Aug 22/05

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Fuel Manifold Hose (Primary) Fuel Manifold Hose (Secondary)	49-31-03	01	50 55

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 424-007

(1) Install the fuel manifold hoses:

**NOTE:** The primary fuel hose has straight fittings on the ends.  
The secondary fuel hose has 90° fittings on the ends.

- (a) Connect the primary fuel hose to the fuel flow divider and the primary fuel manifold.
- (b) Connect the secondary fuel hose to the fuel flow divider and the secondary fuel manifold.
- (c) Tighten all the hose fittings to 120-135 inch-pounds (13.6-15.3 newton-meters).
- (d) Install the lockwires on the hose fittings.

S 864-008

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-009

(3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-31-09

03

Page 404  
Aug 22/05

S 794-010

- (4) Do a leakage test for the installation of the fuel manifold hoses:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel manifold hoses for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-31-09

01

Page 405  
Aug 22/05

FUEL FILTER DIFFERENTIAL PRESSURE INDICATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the differential pressure indicator for the fuel filter.
- B. The differential pressure indicator is on the fuel control unit. You can get access to the differential pressure indicator through the APU access doors.

TASK 49-31-10-004-001

2. Fuel Filter Differential Pressure Indicator Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

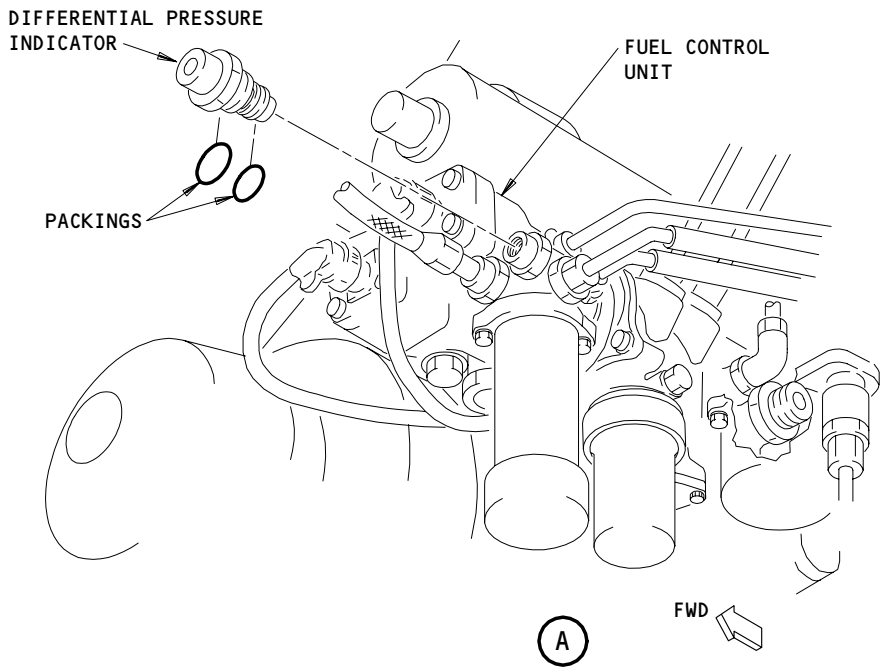
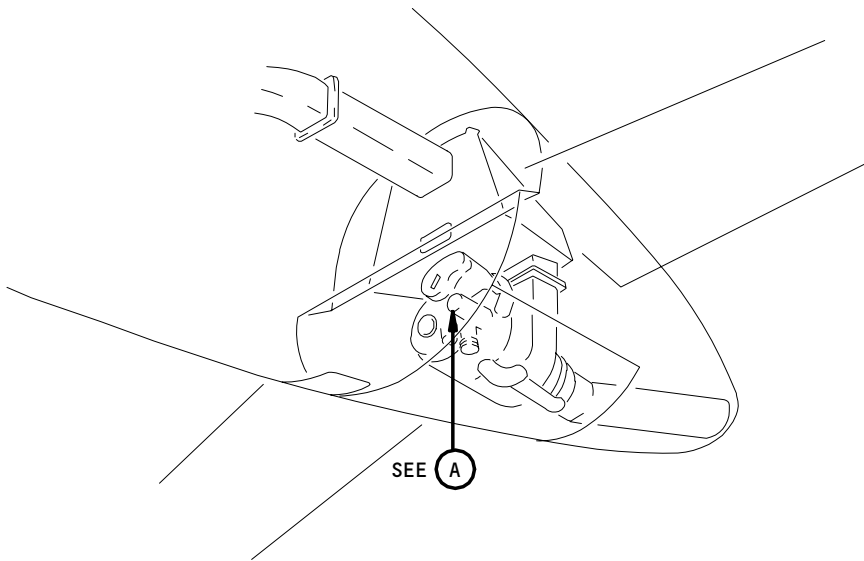
EFFECTIVITY

ALL

49-31-10

03

Page 401  
Aug 22/01



Fuel Filter Differential Pressure Indicator Installation  
Figure 401

EFFECTIVITY	
	ALL

49-31-10

01

Page 402  
May 10/91

2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the differential pressure indicator:
- (a) Remove the lockwire from the differential pressure indicator.
  - (b) Remove the differential pressure indicator from the fuel control unit.
  - (c) Remove the packings from the differential pressure indicator.
  - (d) Discard the packings.

TASK 49-31-10-404-006

3. Fuel Filter Differential Pressure Indicator Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or

EFFECTIVITY

ALL

49-31-10

03

Page 403  
Aug 22/01

(2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

B. References

(1) AMM 49-11-00/201, Auxiliary Power Unit

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Fuel Filter Differential Pressure Indicator	49-31-10	01	55
		Packing			60
		Packing			65

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the differential pressure indicator:
- (a) Lubricate the new packings with a light coat of lubricant.
  - (b) Install the packings on the differential pressure indicator.
  - (c) Install the differential pressure indicator on the fuel control unit.
  - (d) Tighten the differential pressure indicator to 105-115 inch-pounds (11.9-13.0 newton-meters).
  - (e) Install a lockwire on the differential pressure indicator.

S 864-008

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-009

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-31-10

04

Page 404  
Aug 22/05



S 794-010

- (4) Do a leakage test on the installation of the differential pressure indicator:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the fuel control unit for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-011

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-31-10

01

Page 405  
Aug 22/05

APU IGNITION AND STARTING SYSTEM – DESCRIPTION AND OPERATION

1. General (Fig. 1)

A. AIRPLANES WITHOUT TRANSFORMER RECTIFIER UNIT;

The APU ignition and starting system provides the means of accelerating the APU engine to starting speed and igniting the fuel-air mixture in the combustor. The system consists of a starter motor, ignition unit, igniter plug, and an igniter lead. The APU battery provides 28v dc to the system. The ignition and starting system is automatically controlled by the APU control unit.

B. AIRPLANES WITH TRANSFORMER RECTIFIER UNIT;

The APU ignition and starting system provides the means of accelerating the APU engine to starting speed and igniting the fuel-air mixture in the combustor. The system consists of a starter motor, ignition unit, igniter plug, and an igniter lead. The Transformer Rectifier Unit (TRU) provides 28v dc to the system. The APU battery serves as a backup power source. The ignition and starting system is automatically controlled by the APU control unit.

2. Component Details

A. Ignition Unit (Fig. 1)

(1) The ignition unit converts battery power into high voltage current required to produce a capacitive spark at the igniter plug. It has a 28-volt dc input and an 18 kv output. The unit consists of a transformer, electronic vibrator, rectifier, booster coil, and series of capacitors all enclosed in a single case. It is located below the mounting bracket on the right rear side.

B. Ignition Lead (Fig. 1)

(1) The ignition lead conducts the output voltage of the ignition unit to the igniter plug. The lead consists of an insulated electrical conductor encased in a braided copper conduit with insulated, threaded connectors at each end. The lead and connectors are shielded to prevent radio interference.

C. Igniter Plug (Fig. 1)

(1) The igniter plug provides a high energy spark for igniting the fuel-air mixture in the engine combustor. It consists of an outer casing, a center electrode made of tungsten alloy, a ceramic insulator, and a Hastelloy X tip. It is located on the right side of the combustor case.

D. Starter Motor (Fig. 2)

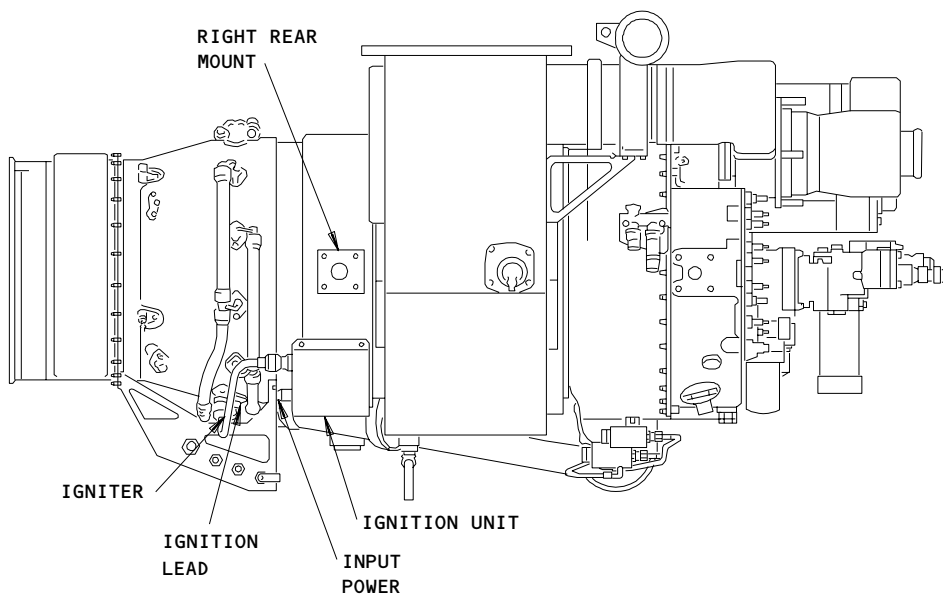
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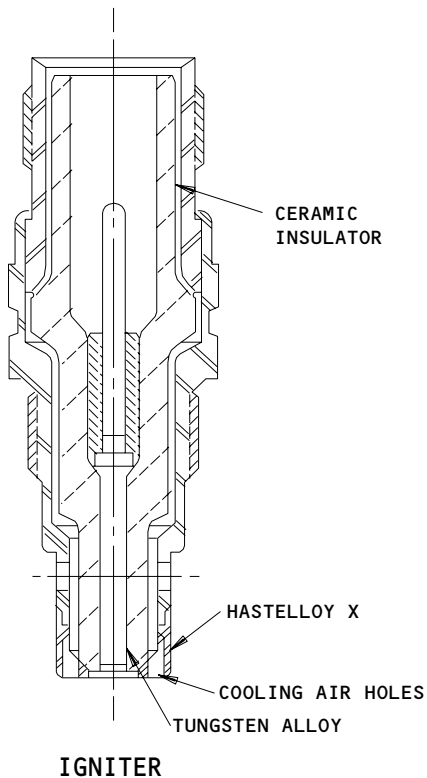
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03

Page 1  
Dec 22/99



RIGHT SIDE



APU Ignition System Location  
Figure 1

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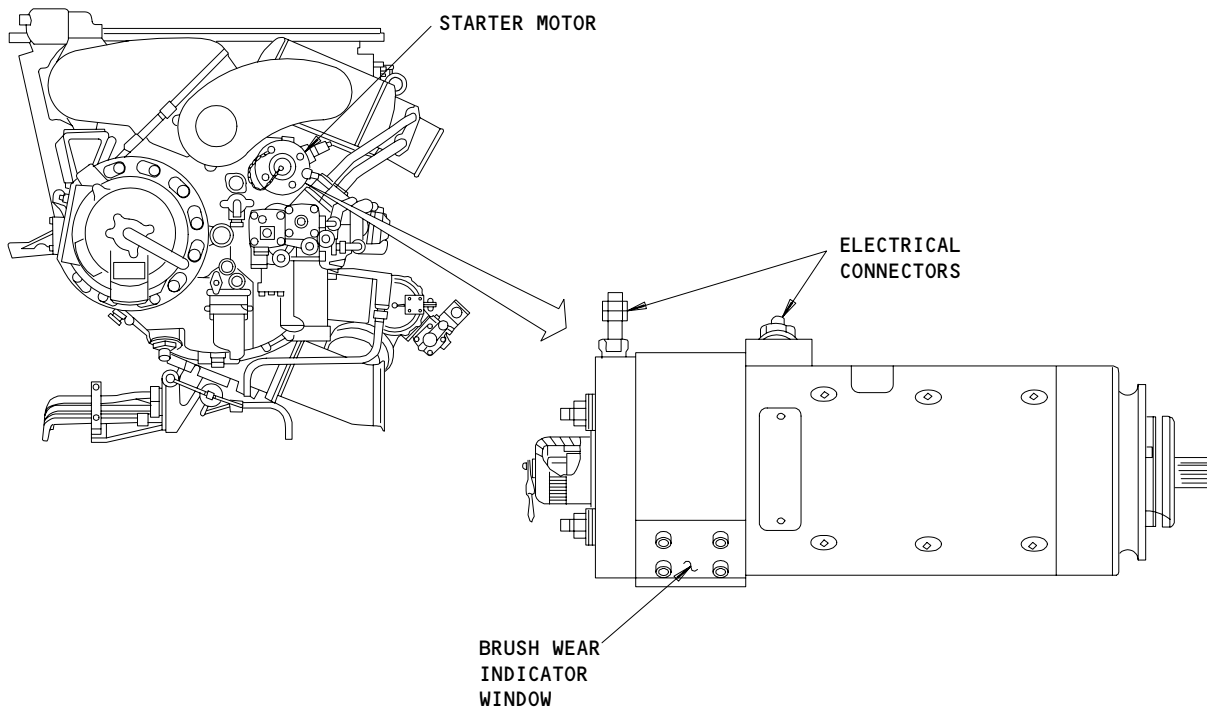
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Page 2  
May 01/82

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- (1) AIRPLANES WITH TRANSFORMER RECTIFIER UNIT;  
The starter motor has four brushes and four poles. It is powered by 28v dc from the TRU or APU battery. An indicator peg for brush wear is located under a transparent window. The starter motor is mounted with a V-band clamp on the upper left side of the accessory gearbox.
- (2) AIRPLANES WITHOUT TRANSFORMER RECTIFIER UNIT;  
The starter motor has four brushes and four poles. The starter is powered by 28 volts dc from the APU battery. An indicator peg for brush wear is located under a transparent window. The starter motor is mounted with a V-band clamp on the upper left side of the accessory gearbox.



APU Starter Location  
Figure 2

EFFECTIVITY

ALL

49-41-00

06

Page 3  
Dec 22/99

3. Operation

A. Functional Description

(1) Start Sequence

(a) AIRPLANES WITHOUT TRANSFORMER RECTIFIER UNIT;

Positioning the APU start switch to START, then releasing to ON, initiates the start sequence. The fuel shutoff valve for the APU opens allowing a fuel pump (APU dc fuel pump or ac boost pump) to supply fuel to the APU. The actuator for the APU intake door is energized and when door is fully opened a ground start/on signal is supplied to the APU control unit. The APU control unit energizes the start relay which closes the APU crank contactor to complete the circuit to supply 28v dc power to the starter motor. When the engine reaches 7% speed, the APU control unit energizes the ignition unit. The electronic vibrator in the ignition unit converts the 28v dc power to pulsating current. The voltage is stepped up and passed through a rectifier into storage capacitors. When the capacitors are fully charged, the capacitor air gap breaks down. High voltage current discharges into the primary coils of the booster coil. The secondary windings of the booster coil produce a surge current which is transmitted through the igniter lead to the center electrode of the igniter plug. At 50% engine speed, the APU control unit de-energizes the starter motor. At 95% engine speed, the APU control unit de-energizes the ignition unit. The heat of combustion sustains operation and the engine accelerates until 100% speed is reached.

(b) AIRPLANES WITH TRANSFORMER RECTIFIER UNIT;

Positioning the APU start switch to START, then releasing to ON, initiates the start sequence. The fuel shutoff valve for the APU opens allowing a fuel pump (APU dc fuel pump or ac boost pump) to supply fuel to the APU. The actuator for the APU intake door is energized and when door is fully opened a ground start/on signal is supplied to the APU control unit. The TRU converts 115v ac power to 28v dc power and supplies it to the starter motor. When the TRU is not being used, the APU control unit energizes the start relay which closes the APU crank contactor to complete the circuit to supply 28v dc power to the starter motor. When the engine reaches 7% speed, the APU control unit energizes the ignition unit. The electronic vibrator in the ignition unit converts the 28 volt dc power to pulsating current. The voltage is stepped up and passed through a rectifier into storage capacitors. When the capacitors are fully charged, the capacitor air gap breaks down. High voltage current discharges into the primary coils of the booster coil. The secondary windings of the booster coil produce a surge current which is transmitted through the igniter lead to the center electrode of the igniter plug. At 50% engine speed, the APU control unit de-energizes the starter motor. At 95% engine speed, the APU control unit de-energizes the ignition unit. The heat of combustion sustains operation and the engine accelerates until 100% speed is reached.

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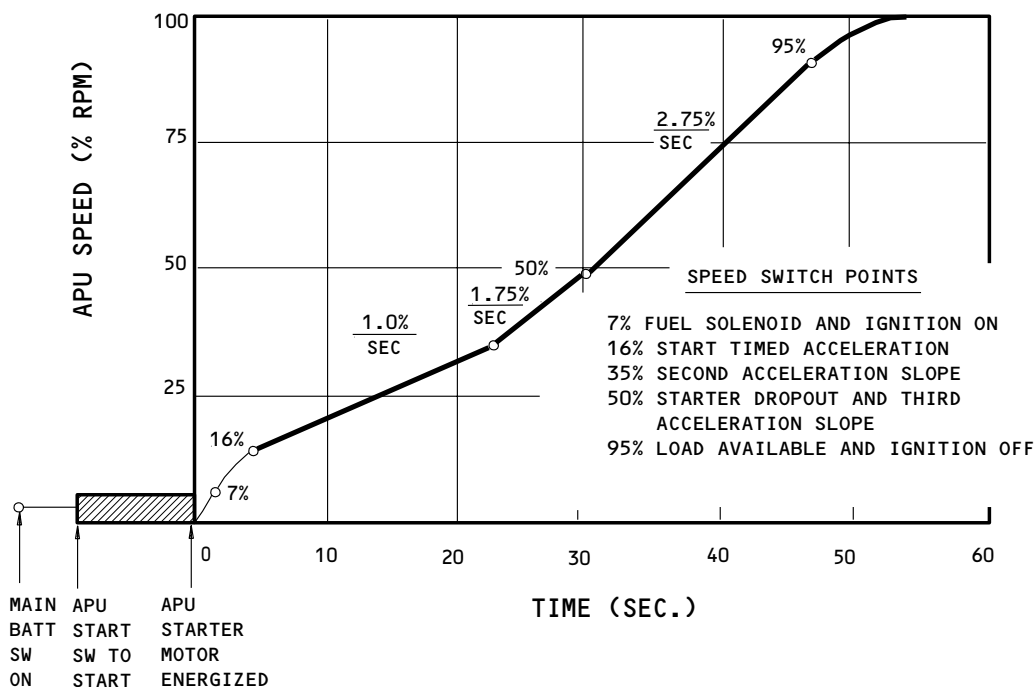
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49-41-00

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Page 4  
Apr 22/01

- (2) APU Control Unit (Fig. 3)
- (a) The APU control unit provides control logic for APU start. It uses three logic programs: timed acceleration, speed sequencing, and ultimate temperature trim.
  - (b) Timed Acceleration
    - 1) The APU control unit selects set points for the governor reference to control fuel flow to the APU as it accelerates. It supplies only enough fuel to keep engine speed the same as the governor reference. Set points are increased as a function of time from an initial speed of 16%.
  - (c) Speed Sequencing
    - 1) After start is initiated, the APU control unit controls all APU engine components. At 7% speed, it energizes the ignition unit and the solenoid valve for the fuel control. At 50% speed, the starter motor is de-energized. At 95% speed, the ignition unit is de-energized while the solenoid valve for the flow divider is opened. Beyond this point, APU electrical and pneumatic loading is allowed.
  - (d) Ultimate Temperature Trim
    - 1) The APU control unit protects against engine overtemperature through fuel flow control.



APU Start Acceleration  
Figure 3

EFFECTIVITY ————  
ALL

49-41-00

(e) Speed Governing

- 1) The APU control unit has two separate 100% speed set points, in a non-MES mode for ground operations and in a MES mode for in-flight operations.

B. BITE

- (1) The APU control unit monitors the ignition and starting system operation and components and writes the faults it finds in BITE memory (AMM 49-61-00/001). Failures of the ignition unit, starter contactor, and APU starter are shown on the FAULTY LRU matrix. These failures are shown as IGN UNIT, A/C STRT CIRCUIT, or APU STARTER. Automatic shutdowns because of starting and ignition faults are shown in the REASON APU NOT OPERATING matrix.

C. For more details on the APU Ignition and Starting System, refer to these wiring diagrams and functional schematics:

- WDM 49-14-11: Auxiliary Power Unit Harness Electrical Accessories
- WDM 49-15-11: Auxiliary Power Unit Air Intake Door
- WDM 49-41-11: Auxiliary Power Unit Starter
- WDM 49-61-11: Auxiliary Power Unit Control System
- SSM 49-00-04: Auxiliary Power Unit Ignition and Starting.

EFFECTIVITY

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**49-41-00**




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Page 6  
Apr 22/01



767  
 FAULT ISOLATION/MAINT MANUAL

APU IGNITION AND STARTING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ACTUATOR - (FIM 49-15-00/101) APU INLET DOOR, M406				
BATTERY - (FIM 24-31-00/101) APU, M208				
CARD 3 - (FIM 26-15-00/101) FIRE/OVHT LOGIC TEST, M10400				
CIRCUIT BREAKER - APU ALTN CONT, C1391	1	1	FLT COMPT, P6, P11	*
APU START TRU CONT, C865 		1	11B35	
FIRE EXT APU 1, C780		1	6H12	*
CIRCUIT BREAKER - APU START TRU POWER 		1	6G1	
CIRCUIT BREAKER - APU INLET DOOR ACTUATOR, C1385	1	1	MAIN EQUIP CTR, P32	*
APU PRIME CONT, C1382		1	822, AFT EQUIP CTR, P49	*
APU START, C20		1		*
APU START TRU FAN 				*
CLUTCH - STARTER	2	1	316AR, 315AL, APU COMP, FRONT OF APU	49-41-06
CONTACTOR - APU CRANK, K117	2	1	882, AFT CARGO DOOR, E6 RACK, P49, C3	49-41-05
DIODE - (FIM 31-01-34/101) R110				
R111				
DIODE - (FIM 31-01-37/101) R65				
DIODE - (FIM 31-01-49/101) R11				
R12				
LEAD - IGNITION	1	1	316AR, 315AL, APU COMP, RIGHT SIDE OF COMBUSTOR	49-41-04
MOTOR - STARTER, M893	2	1	316AR, 315AL, APU COMP, FRONT OF APU	49-41-01

\* SEE THE WDM EQUIPMENT LIST

 AIRPLANES WITH TRANSFORMER RECTIFIER UNIT

APU Ignition and Starting System - Component Index  
 Figure 101 (Sheet 1)

EFFECTIVITY

ALL

49-41-00







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Page 101  
 Aug 22/99

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767  
FAULT ISOLATION/MAINT MANUAL

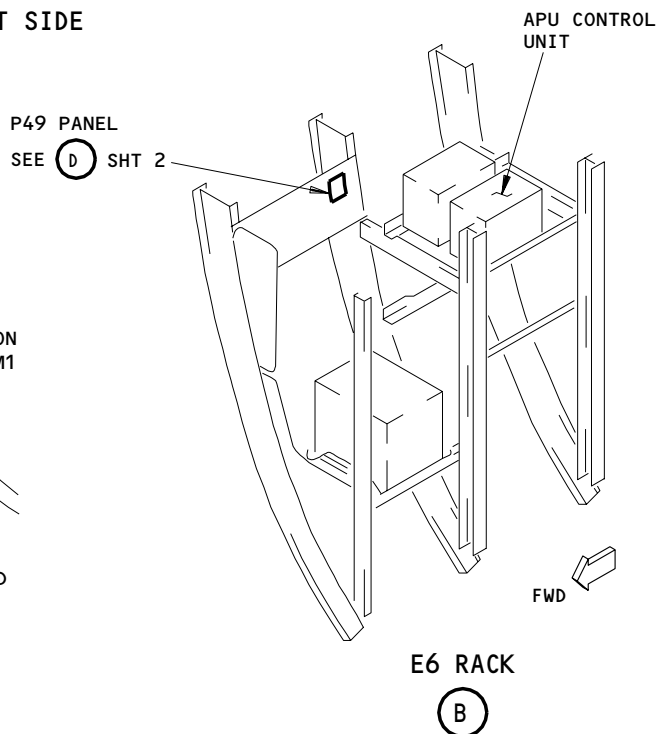
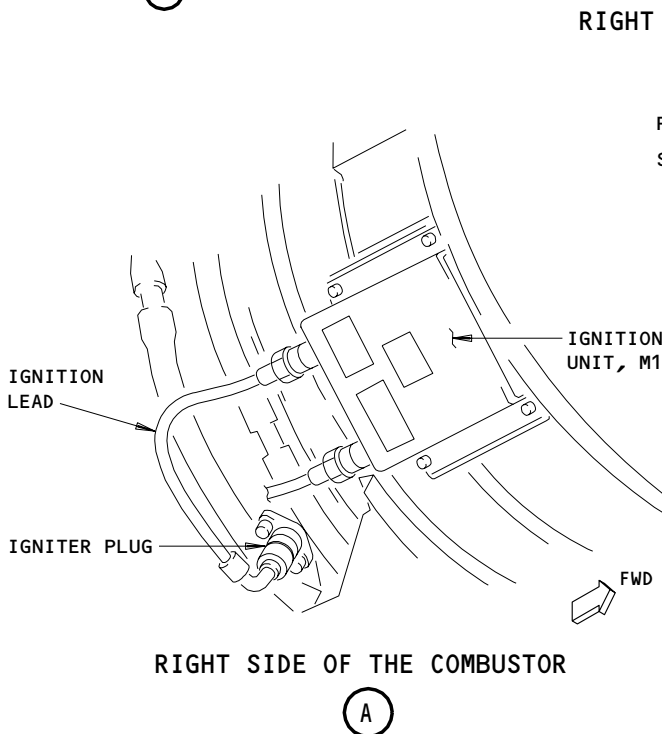
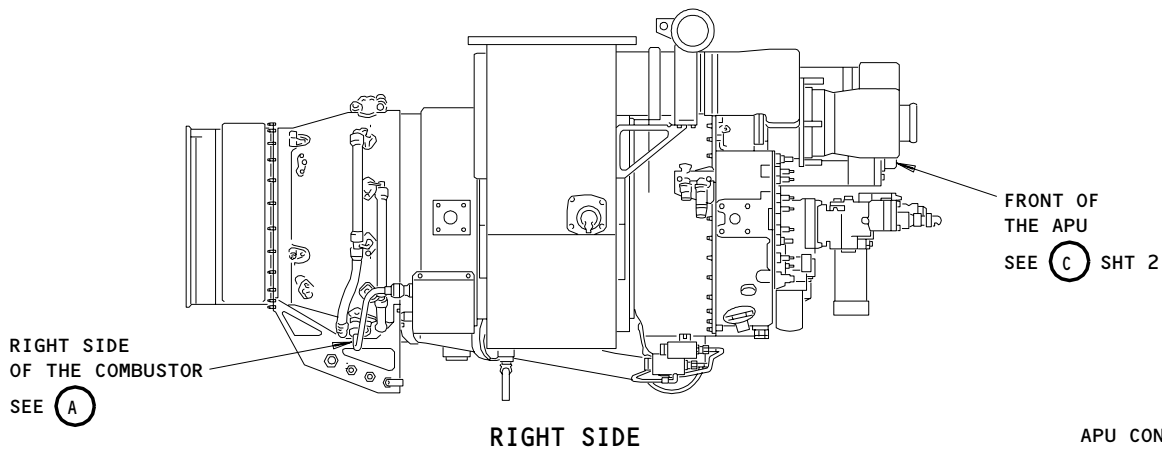
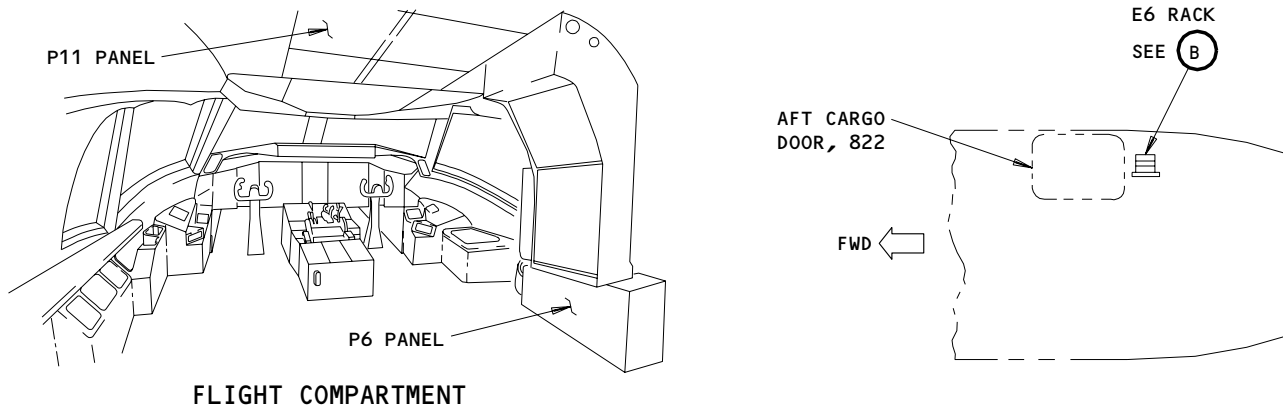
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
PANEL - (FIM 24-33-00/101) STBY PWR CONT, M10062 PANEL - (FIM 26-11-00/101) FIRE/OVHT TEST, M10445 PANEL - (FIM 26-15-00/101) APU SHUTDOWN, P40 PANEL - (FIM 49-61-00/101) APU CONTROL, M1 PLUG - IGNITER, M1  RELAYS - (FIM 31-01-37/101) APU FAULT, K442 APU FUEL CONT, K175 EXT SHUTDOWN, K421 SYSTEM NO. 2 AIR/GND, K203 RELAYS - (FIM 31-01-49/101) APU START, K197 APU START CONTROL  APU START ENABLE  APU START TRU FAN CONT  APU START TRU OVERHEAT  APU TRU START  SWITCH - (FIM 26-22-00/101) APU FIRE, S39 SWITCH - (FIM 49-15-00/101) INLET DOOR OPEN, S506 UNIT - (FIM 24-32-00/101) APU START TRANSFORMER RECTIFIER, T189  UNIT - IGNITION, M1	1	1	316AR, 315AL, APU COMP, RIGHT SIDE OF COMBUSTOR	49-41-02
	1	1	316AR, 315AL, APU COMP, RIGHT SIDE OF COMBUSTOR	49-41-03

APU Ignition and Starting System - Component Index  
Figure 101 (Sheet 2)

EFFECTIVITY

ALL

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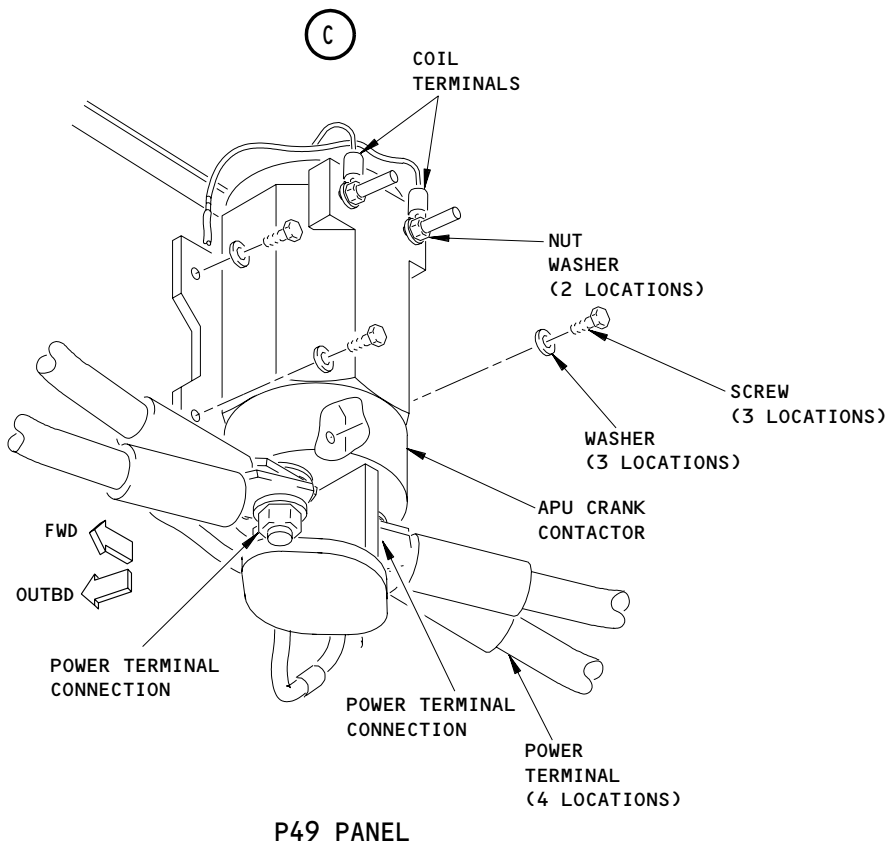
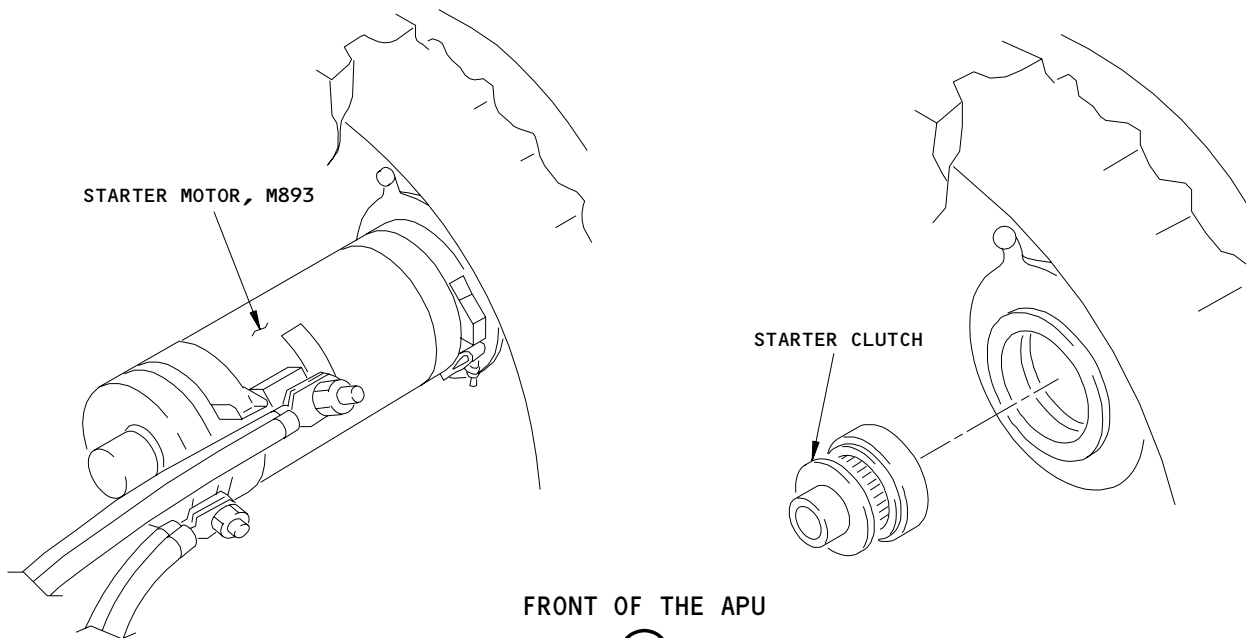


APU Ignition and Starting System - Component Location  
Figure 102 (Sheet 1)

EFFECTIVITY	
	ALL

49-41-00

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767  
FAULT ISOLATION/MAINT MANUAL



APU Ignition and Starting System - Component Location (Details from Sht 1)  
Figure 102 (Sheet 2)

EFFECTIVITY	
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**49-41-00**

STARTER MOTOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the Starter Motor
  - (2) An installation of the Starter Motor.
- B. The starter motor is on the left side of the APU gearbox face. You can get access to the starter motor through the APU access doors.

TASK 49-41-01-004-001

2. Starter Motor Removal (Fig. 401)

A. References

- (1) AMM 49-41-05/401, APU Crank Contactor
- (2) AMM 49-41-06/601, Starter Clutch

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-41-01

01

Page 401  
Aug 22/06

- (b) P33 Forward Miscellaneous Electrical Equipment Panel
  - 1) 33E5, BATTERY CHARGER APU
- (c) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
  - 3) 49E4, APU BAT CHGR

S 014-027

- (3) Do these steps to disconnect the electrical connector D300 from the APU battery.
  - (a) Open the access door on the front side of the E6 aft equipment center rack to get access to the APU battery.
  - (b) Disconnect the electrical connector D300 from the APU battery.

S 014-004

- (4) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 214-025

- (5) AIRPLANES WITH THE APU CRANK CONTACTOR (HARTMAN PART NUMBER A-703CD) (PRE-SB 49-36);

Do these steps to inspect the APU crank contactor, K117:

- (a) Get access to the P49 APU auxiliary panel.

EFFECTIVITY

ALL

49-41-01

05

Page 402  
Aug 22/06

- (b) Make sure the APU crank contactor, K117, did not fail in the closed position or show signs of an overheated condition as follows:

**NOTE:** If you find discoloration on the terminal studs or the structural components of the starter motor, the starter motor was overheated because of a defective APU crank contactor.

- 1) Remove the APU crank contactor (AMM 49-41-05/401).
- 2) Remove the screw, lockwasher and terminal shield from the APU crank contactor.
- 3) Get access to the internal parts of the APU crank contactor by removing the cover plate and cover assembly.
- 4) Examine the internal parts of the APU crank contactor:
  - a) Two main contactors show pitting on more than 75% of the total area.
  - b) Two main contactors for a shorted (welded) condition or show signs of burn or discoloration marks.
  - c) Two contact posts or two coil terminal posts for stripped studs or show signs of pitting and burned or discoloration marks.
  - d) Contactor coil shows signs of wrapping discoloration or a distorted bobbin.
  - e) If you find one or more of the above damage, replace the APU crank contactor.
  - f) If you find no damage, assemble the APU crank contactor by installing the cover assembly, cover plate and terminal shield.
- 5) Install the APU crank contactor (AMM 49-41-05/401).

S 024-024

**WARNING:** BE CAREFUL WHEN YOU DISCONNECT THE ELECTRICAL CABLES FROM THE STARTER MOTOR. IT IS POSSIBLE THAT THERE IS ELECTRICAL POWER AT THE TERMINAL POSTS EVEN WITH THE APU POWER CIRCUIT BREAKERS OPENED. PUT ON PROTECTIVE GLOVES AND USE INSULATED TOOLS. INJURY TO PERSONS CAN OCCUR BY AN ELECTRICAL SHOCK.

- (6) Remove the starter motor:
- (a) Remove the two terminal nuts (5) or the locknut (4) and the washer (15).
  - (b) Disconnect the positive electrical cables (6) and the fuse assembly (7) from the terminal post.
  - (c) Remove the two terminal nuts (8) or the locknut (13) and the washer (14), to disconnect the negative electrical cables (9) from the terminal post.
  - (d) Remove the nuts (11) and the bonding jumpers (10 and 12) from the starter motor (1).

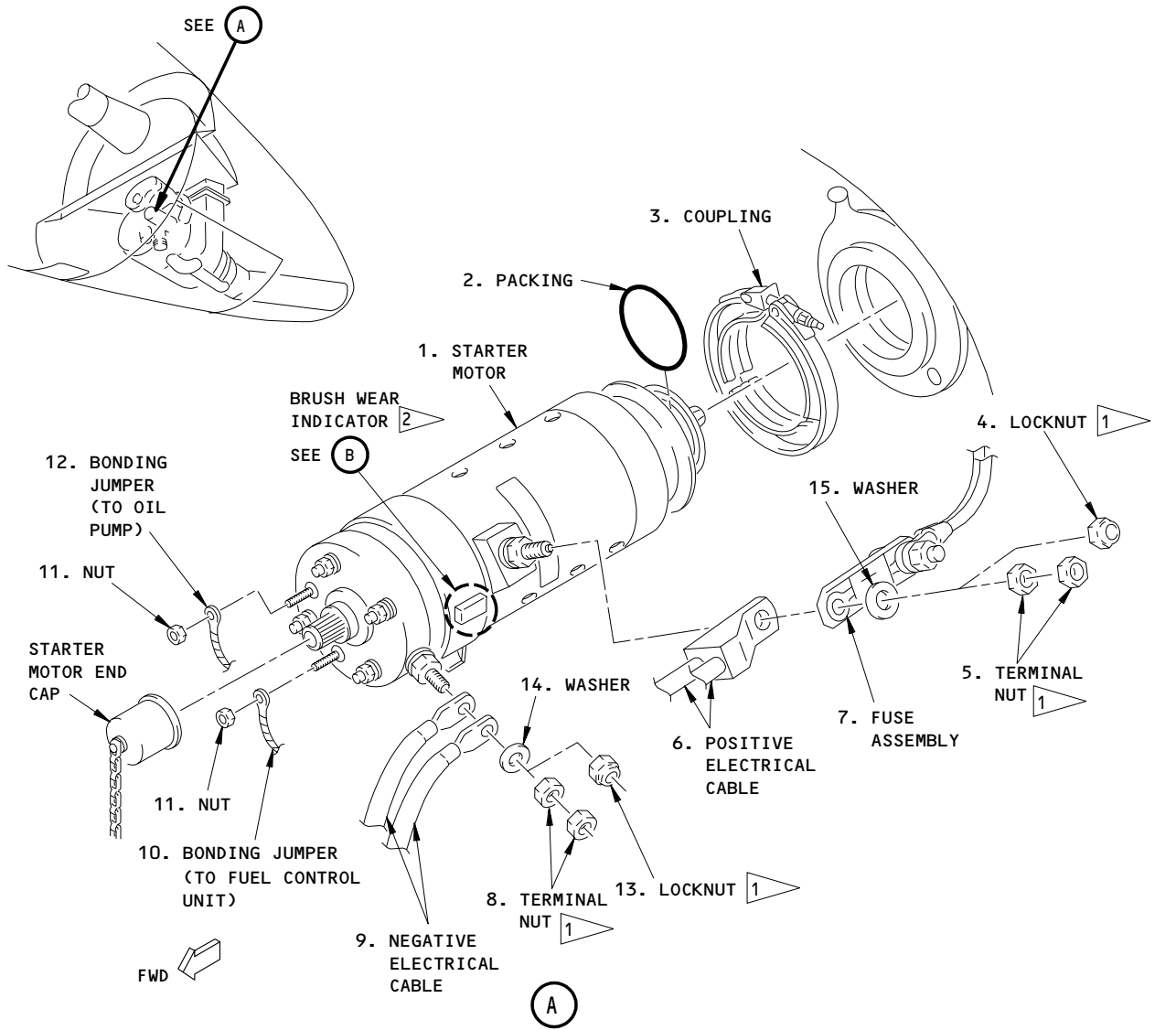
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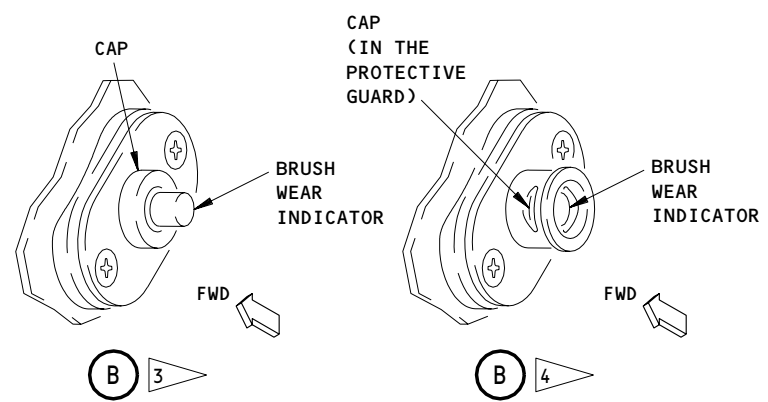
49-41-01

06

Page 403  
Aug 22/06



- 1 TWO TERMINAL NUTS ARE OPTIONAL TO THE ONE LOCKNUT
- 2 APU WITH THE -5 AND -6 STARTER MOTORS
- 3 APU WITH THE -7 STARTER MOTORS
- 4 APU WITH THE -8 STARTER MOTORS



Starter Motor Installation  
Figure 401

EFFECTIVITY	ALL
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49-41-01

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**NOTE:** When the nut on the tie-bolt stud is loosened, the stud will move freely in the starter motor. It is not necessary to replace the starter because this is a usual condition.

**WARNING:** DO NOT LET THE ENGINE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS THROUGH YOUR SKIN FROM THE OIL.

- (e) Remove the coupling (3) and pull the starter motor (1) out of the gearbox.
  - 1) Remove and discard the packing (2).

S 284-006

- (7) Do this task: Starter Clutch Inspection (AMM 49-41-06/601).

TASK 49-41-01-404-007

3. Starter Motor Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Starter Motor	49-41-01	01	50
	2	Packing			170

C. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-41-06/601, Starter Clutch
- (4) AMM 49-61-05/201, APU Control Unit

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

EFFECTIVITY

ALL

**49-41-01**

05

Page 405  
Aug 22/06



- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 144-008

- (1) Clean the gearbox mounting flange for the starter motor.

S 424-009

- (2) Install the APU starter motor:
  - (a) Lubricate the new packing (2) with a light coat of lubricant or oil.
  - (b) Install the packing (2) on the starter motor (1).
  - (c) Lubricate the splines on the shaft of the starter motor (1) with oil.
  - (d) Install the starter motor (1) on the APU gearbox.

NOTE: Make sure the index pin is aligned when you install the starter motor on the gearbox.

- (e) Install the coupling (3) on the starter motor (1).
  - 1) Tighten the coupling (3) to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - 2) Loosen and tighten the coupling (3) as necessary to make sure the coupling is installed correctly.
- (f) Attach the bonding jumpers (10 and 12) to the tie-bolt studs on the starter motor (1) with the nuts (11).

NOTE: When the nut on the tie-bolt stud is loosened, the stud will move freely in the starter motor. It is not necessary to replace the starter motor because this is a usual condition.

- 1) Tighten the nuts (11) to 100 inch-pounds (11.3 newton-meters).
- (g) Connect the positive electrical cables (6) to the starter motor:
  - 1) Put the positive electrical cables (6) and the fuse assembly (7) on the starter motor (1).
  - 2) Let the positive electrical cables (6) go to their free position.
  - 3) Hold the positive electrical cables (6) in the free position and install the two terminal nuts (5) or the locknut (4).
  - 4) Tighten the terminal nuts (5), one at a time, or the locknut (4) to 75-80 inch-pounds (8.5-9.0 newton-meters).

EFFECTIVITY

ALL

49-41-01

02

Page 406  
Aug 22/03

- (h) Connect the negative electrical cables (9) to the starter motor (1):
  - 1) Put the negative electrical cables (9) on the starter motor (1).
  - 2) Let the negative electrical cables (9) go to their free position.
  - 3) Hold the negative electrical cables (9) in the free position and install the washer (14) and the two terminal nuts (8) or the locknut (13).
  - 4) Tighten the two terminal nuts (8), one at a time, or the locknut (13) to 50-55 inch-pounds (5.7-6.2 newton- meters).

S 424-026

- (3) Do these steps to connect the APU battery connector:
  - (a) Connect the APU battery connector to the APU battery.
  - (b) Close the access cover on the forward side of the E6 rack.

S 864-010

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
    - 3) 49E4, APU BAT CHGR
  - (b) P33 Forward Miscellaneous Electrical Equipment Panel
    - 1) 33E5, BATTERY CHARGER APU
  - (c) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 744-011

- (5) Do this task: APU Control Unit - BITE Test (AMM 49-61-05/201).

S 864-012

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 714-013

- (7) Do an operational test of the starter motor clutch:
  - (a) Remove the end cap on the starter motor.

**CAUTION:** IMMEDIATELY DO AN APU SHUTDOWN IF THE STARTER MOTOR DOES NOT DISENGAGE AT THE OPERATIONAL SPEED OF THE APU. DAMAGE TO THE STARTER MOTOR AND THE STARTER MOTOR CLUTCH CAN OCCUR.

- (b) Do this task: APU Starting and Operation (AMM 49-11-00/201).
- (c) During the APU start procedure, look at the starter motor to make sure the shaft disengages at the APU operational speed.
- (d) If the starter motor does not disengage at the APU operational speed, do these steps:
  - 1) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

EFFECTIVITY

ALL

49-41-01

04

Page 407  
Aug 22/03

 **BOEING**  
767  
MAINTENANCE MANUAL

- 2) Do this task: Starter Clutch Inspection  
(AMM 49-41-06/601).
- (e) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- (f) Install the end cap on the starter motor.
- S 414-014
- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.
- NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-41-01

05

Page 408  
Aug 22/03

STARTER MOTOR - INSPECTION/CHECK

1. General

- A. This procedure has the task to inspect the brush wear indicator on the starter motor.

TASK 49-41-01-206-015

2. Starter Motor Brush Inspection (Fig. 601)

A. References

- (1) AMM 49-41-01/401, Starter Motor

B. Equipment

- (1) Air Source - Regulated, Dry Filtered, Compressed (Maximum of 20 psig) (138 kPa) (commercially available)

C. Consumable Materials

- (1) B50051 Cleaner, Alkaline - Arrow 198 (recommended) or  
(2) B50052 Cleaner, Alkaline - Ridoline 909 (alternative) or  
(3) B50053 Cleaner, Alkaline - Daraclean 212 (alternative) or  
(4) B50054 Cleaner, Alkaline - Daraclean 282 (alternative)  
(5) G00034 Cloth, Process Cleaning Absorbent Wiper (Cheesecloth, Gauze)  
- BMS15-5

D. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |
| 822   | Aft Cargo Door          |

E. Prepare for the Inspection

S 866-016

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag:

S 866-017

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
- 1) 11B35, APU ALTN CONT
- (b) P49 APU Auxiliary Panel
- 1) 49C2, APU PRIME CONT
- 2) 49C3, APU START

EFFECTIVITY

ALL

49-41-01

03

Page 601  
Aug 22/04

S 016-018

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

F. Procedure

S 216-024

- (1) APU WITH THE -5 AND -6 STARTER MOTORS;  
Examine the brush wear indicator on the starter motor.

NOTE: The length of the brush wear indicator decreases as the brushes become worn. If the carbon dust does not permit you to see the indicator peg, clean or replace the indicator window.

- (a) If you cannot see the brush wear indicator, replace the starter motor (AMM 49-41-01/401).

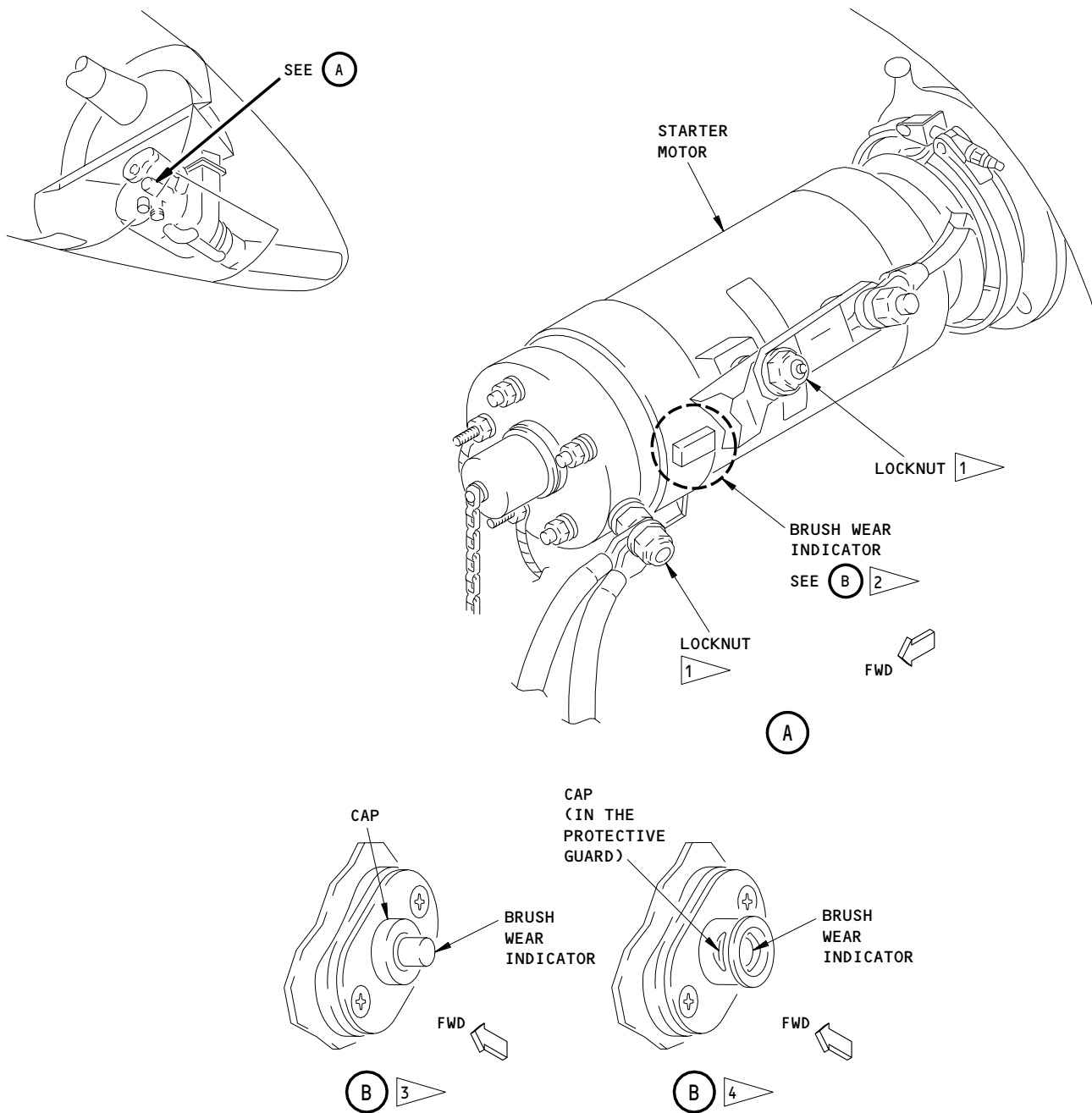
EFFECTIVITY

ALL

49-41-01

02

Page 602  
Aug 22/04



- 1 TWO TERMINAL NUTS (NOT SHOWN) ARE OPTIONAL TO THE ONE LOCKNUT
- 2 APU WITH THE -5 AND -6 STARTER MOTORS
- 3 APU WITH THE -7 STARTER MOTORS
- 4 APU WITH THE -8 STARTER MOTORS

Starter Motor Inspection  
Figure 601

EFFECTIVITY

ALL

49-41-01

04

Page 603  
Aug 22/04

S 216-025

- (2) APU WITH THE -7 STARTER MOTORS;  
Examine the brush wear indicator on the starter motor.

NOTE: The brush wear indicator is an indicator button that retracts into the cap of the starter motor when the brushes become worn.

- (a) If the top of the indicator button on the brush wear indicator is flush or is flat with the top of the cap on the starter motor, replace the starter motor (AMM 49-41-01/401).

S 216-026

- (3) APU WITH THE -8 STARTER MOTORS;  
Examine the brush wear indicator on the starter motor.

NOTE: The brush wear indicator is an indicator button that retracts into the cap of the starter motor when the brushes become worn. The location of the brush wear indicator and the cap of the starter motor is in the protective guard. There are two side windows on the protective guard to see the position of the brush wear indicator and the top of the cap. If grease, dirt or other contamination does not permit you to see the brush wear indicator, clean the area with an alkaline cleaner, water, cloth and air source.

- (a) If the top of the indicator button on the brush wear indicator is flush or is flat with the top of the cap on the starter motor, replace the starter motor (AMM 49-41-01/401).

S 416-021

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

EFFECTIVITY

ALL

49-41-01

04

Page 604  
Aug 22/04

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 866-022

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 866-023

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-41-01

02

Page 605  
Aug 22/04



IGNITER PLUG - REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the igniter plug
  - (2) An installation of the igniter plug.
- B. The igniter plug is on lower right side of the APU, adjacent to the ignition unit. You can get access to the igniter plug through the APU access doors.

TASK 49-41-02-004-001

2. Igniter Plug Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

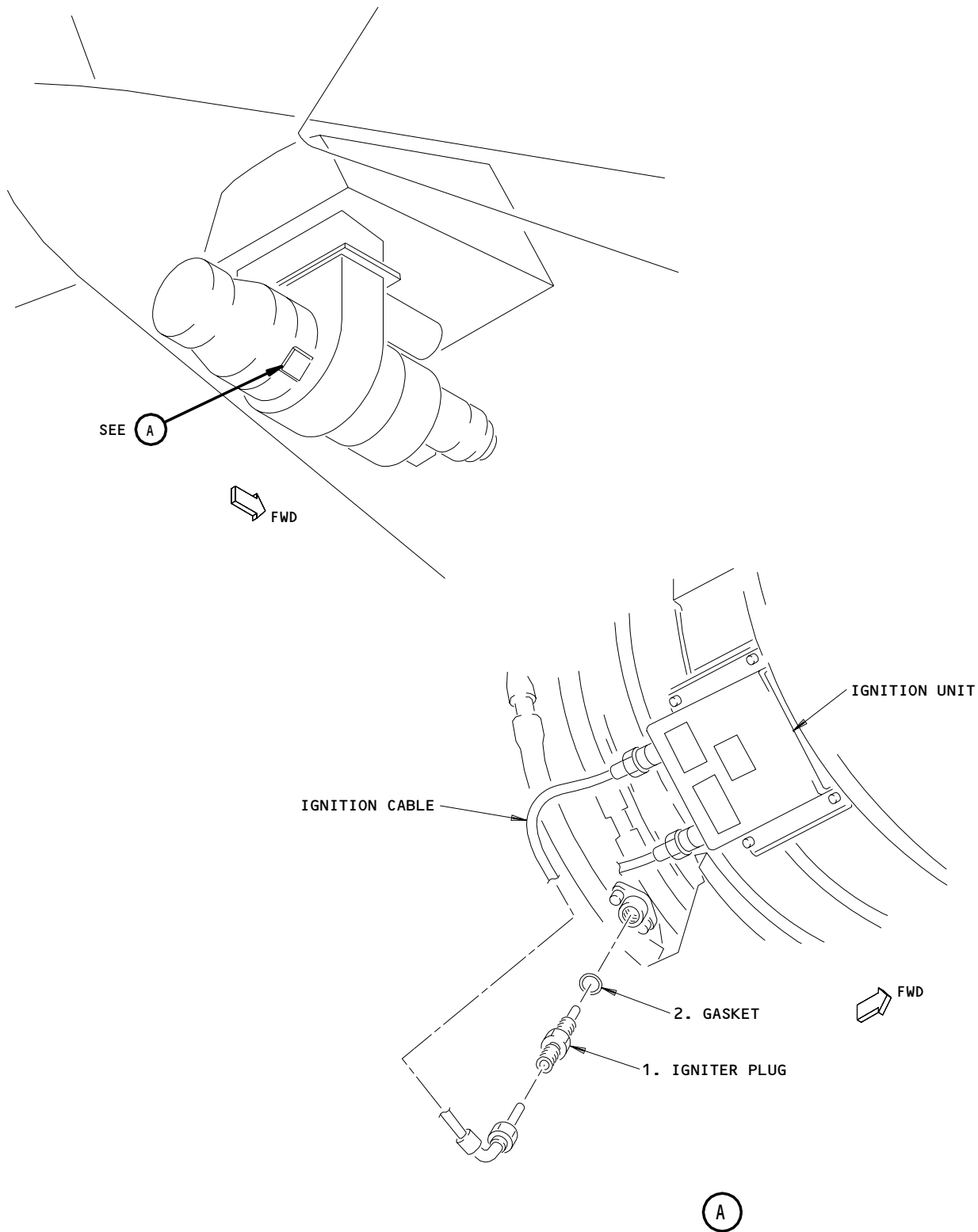
EFFECTIVITY

ALL

49-41-02

01

Page 401  
Apr 22/04



Igniter Plug Installation  
Figure 401

EFFECTIVITY	
	ALL

49-41-02

01

Page 402  
Dec 10/98

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

**NOTE:** The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

**NOTE:** You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

**NOTE:** The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the APU igniter plug:

**WARNING:** DO NOT TOUCH THE IGNITION COMPONENTS UNTIL YOU DO THESE STEPS. THESE STEPS WILL RELEASE THE HIGH VOLTAGE FROM THE IGNITION UNIT. IF YOU DO NOT OBEY THESE STEPS, INJURY TO PERSONS CAN OCCUR.

- (a) Release the high voltage from the ignition unit:
  - 1) Make sure a minimum of 5 minutes has gone by since the last APU start.
  - 2) Disconnect the ignition lead from the igniter plug (1).
  - 3) Ground the end of the ignition lead to the APU engine.
- (b) Remove the igniter plug (1) and the gasket (2) from the APU.
  - 1) Discard the gasket (2).

TASK 49-41-02-404-006

### 3. Igniter Plug Installation (Fig. 401)

#### A. Consumable Materials

- (1) D00010 Compound - Antiseize, MIL-A-907, Fel-Pro C5-A

EFFECTIVITY

ALL

**49-41-02**

03

Page 403  
Aug 22/01

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Igniter Plug	49-41-02	02	50
	2	Gasket			55

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 424-007

- (1) Install the APU igniter plug:
- (a) Install the new gasket (2) on the igniter plug (1).
  - (b) Apply a layer of the antiseize compound on the igniter plug threads.
  - (c) Install the igniter plug (1).
    - 1) Tighten the igniter plug (1) to 360-470 inch-pounds (40.7-53.1 newton-meters).
  - (d) Connect the ignition lead to the igniter plug (1).
    - 1) Tighten the ignition lead to 100-105 inch-pounds (11.3-11.9 newton-meters).
  - (e) Install a lockwire on the ignition lead.

S 414-008

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.
 

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
  - (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
  - (c) Lift the left access door until the two APU access doors are approximately aligned.

EFFECTIVITY

ALL

49-41-02

01

Page 404  
Aug 22/05

- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-41-02

03

Page 405  
Aug 22/01

IGNITER PLUG - INSPECTION/CHECK

1. General

- A. This procedure contains this task:
  - (1) A inspection of the Igniter Plug.
- B. The igniter plug is on lower right side of the APU, adjacent to the ignition unit. You can get access to the igniter plug through the APU access doors.

TASK 49-41-02-206-011

2. Igniter Plug Inspection (Fig. 601)

A. References

- (1) AMM 49-41-02/401, Ignitor Plug
- (2) AMM 49-41-02/701, Ignitor Plug

B. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

C. Procedure

S 416-012

- (1) Do this task: Igniter Plug Removal (AMM 49-41-02/401).

S 216-013

- (2) Visually examine the igniter plug:
  - (a) Examine the igniter plug for broken parts and parts that are not there.
  - (b) Shake the igniter plug and listen for noises.
  - (c) If the igniter plug is broken or has parts that are not there, replace the plug.
  - (d) If you heard noises when you shook the igniter plug, replace the plug.

S 286-014

- (3) Examine the igniter plug for internal worn areas and failures:
  - (a) Examine the electrode and the outer shell for erosion.
    - 1) Equal erosion on the electrode and the outer shell is permitted.
    - 2) Measure the distance from the edge of the electrode to the inner edge of the ground shell that has no erosion.
    - 3) Replace the plug if the distance is more than 0.090 inch (2.3 mm).

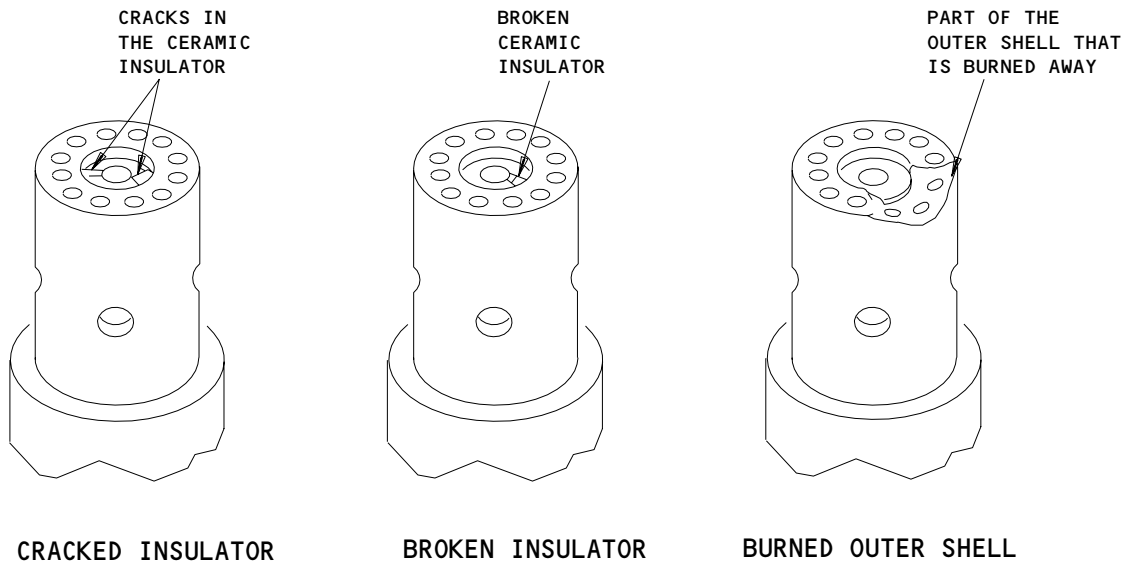
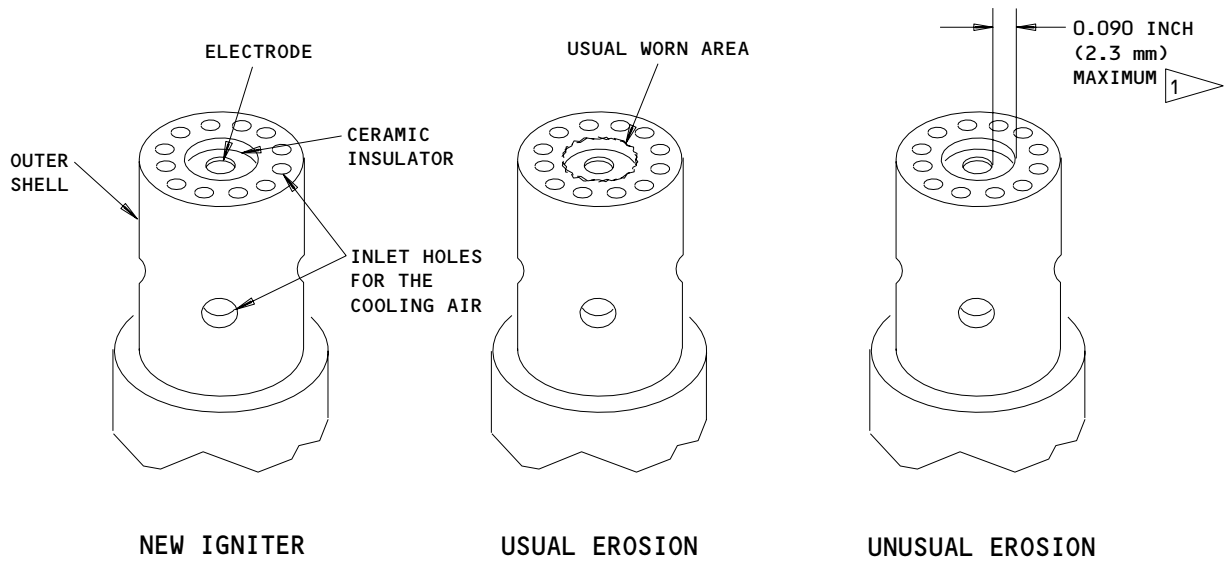
EFFECTIVITY

ALL

49-41-02

01

Page 601  
Aug 22/01



1 THIS IS THE DISTANCE FROM THE EDGE OF THE ELECTRODE TO THE INNER EDGE OF THE GROUND SHELL THAT HAS NO EROSION.

Igniter Plug Inspection  
Figure 601

EFFECTIVITY	ALL
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49-41-02

- (b) Examine the ceramic insulator for cracks and damaged areas.
    - 1) Replace the plug if you find cracks or damage.
  - (c) Examine the outer shell for burned areas.
    - 1) Replace the plug if you find burned areas.
  - (d) Examine the grommet mating flange of the igniter plug for grooves.
    - 1) If you find grooves with a depth of 0.03 inch (0.8 mm) or more on one side, replace the plug.
  - (e) Examine the circular area between the insulator and the outer shell for blockage.
    - 1) If you find blockage, do this task: Igniter Plug Cleaning (AMM 49-41-02/701).
- S 426-020
- (4) Do this task: Igniter Plug Installation (AMM 49-41-02/401).

EFFECTIVITY

ALL

**49-41-02**

01

Page 603  
Apr 22/99



IGNITER PLUG - CLEANING/PAINTING

1. General

- A. This procedure contains this task:
  - (1) Igniter Plug Cleaning.
- B. The igniter plug is on lower right side of the APU, adjacent to the ignition unit. You can get access to the igniter plug through the APU access doors.

TASK 49-41-02-107-016

2. Igniter Plug Cleaning

- A. References
  - (1) AMM 49-41-02/401, Igniter Plug
- B. Standard Tools and Equipment
  - (1) Brush - Stiff Bristled, for carbon deposits
- C. Consumable Materials
  - (1) B00074 Solvent - Degreasing, MIL-PRF-680 Type I (Supersedes P-D-680)
  - (2) G01043 Cloth - Lintfree
- D. Access
  - (1) Location Zones
    - 315        APU Compartment - Left
    - 316        APU Compartment - Right
  - (2) Access Panels
    - 315AL     APU Access Door - Left
    - 316AR     APU Access Door - Right

E. Procedure

S 027-020

- (1) Do this task: Igniter Plug Removal (AMM 49-41-02/401).

S 117-018

- (2) Clean the igniter plug:
  - (a) Use the brush on the igniter plug to remove the carbon particles.

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (b) Clean the igniter plug with the lintfree cloth made moist with the solvent.

EFFECTIVITY

ALL

49-41-02

01

Page 701  
Dec 22/07

 **BOEING**  
767  
MAINTENANCE MANUAL

(c) If you can see carbon particles on the igniter plug, do the above two steps again.

S 427-021

(3) Do this task: Igniter Plug Installation (AMM 49-41-02/401).

EFFECTIVITY

ALL

**49-41-02**

01

Page 702  
Dec 10/98

IGNITION UNIT - REMOVAL/INSTALLATION

1. General

- A. There are two tasks in this procedure. The first task is used to remove the ignition unit. The second task is used to install the ignition unit.

TASK 49-41-03-004-001

2. Ignition Unit Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Prepare for Ignition Unit Removal

S 864-024

- (1) Make sure the APU control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 864-002

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

EFFECTIVITY

ALL

49-41-03

03

Page 401  
Aug 22/01

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

### C. Ignition Unit Removal

S 024-027

WARNING: MAKE SURE THE ELECTRICAL POWER IS REMOVED FROM THE IGNITION SYSTEM FOR FIVE MINUTES OR MORE. THE IGNITION SYSTEM VOLTAGE IS VERY DANGEROUS AND CAN CAUSE INJURY.

WARNING: WHEN THE IGNITION LEAD IS DISCONNECTED, GROUND THE LEAD TO MAKE SURE ALL OF THE ENERGY IS OUT OF THE SYSTEM. IF YOU DO NOT GROUND THE IGNITION LEAD, INJURY CAN OCCUR.

- (1) Disconnect the ignition lead (1) from the igniter and immediately ground the lead.

S 424-028

- (2) Connect the ignition lead to the igniter.
  - (a) Tighten the ignition lead at the igniter to 100-105 inch-pounds (11.3-11.9 newton meters).

S 424-035

- (3) Install a lockwire to the ignition lead at the ignitor.

S 024-029

- (4) Disconnect the ignition lead (1) and the electrical plug (5) from the ignition unit.
  - (a) Put caps on all of the electrical connectors.

S 024-030

- (5) Remove the bolts (2) and the bonding jumpers.

S 024-009

- (6) Remove the ignition unit (3) and the insulator (4).

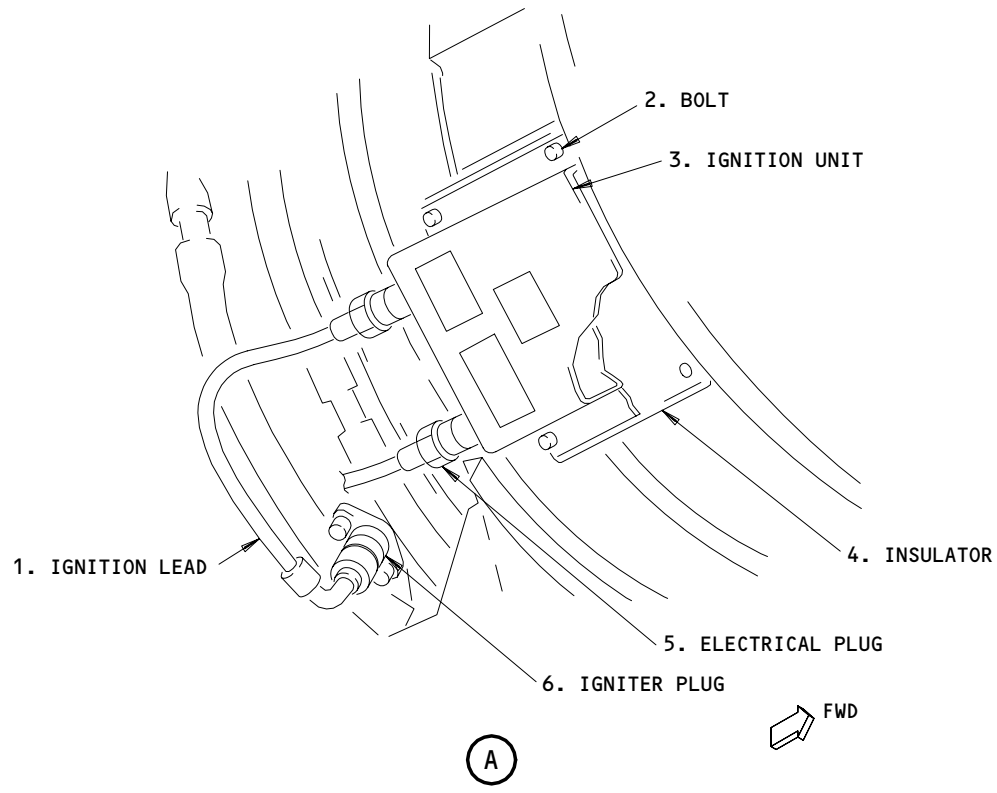
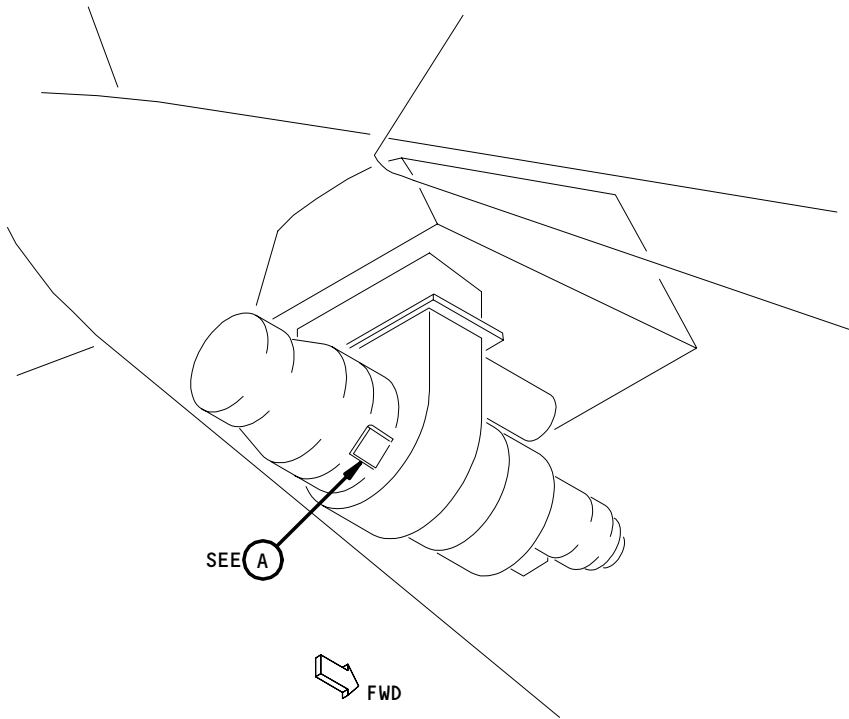
EFFECTIVITY

ALL

49-41-03

02

Page 402  
Dec 22/08



Ignition Unit Installation  
Figure 401

EFFECTIVITY	
	ALL

49-41-03

01

Page 403  
Aug 10/94

TASK 49-41-03-404-010

3. Ignition Unit Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Ignition Unit (Exciter)	49-41-00	01	25

B. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 424-011

- (1) Put the insulator (4) and the ignition unit (3) in their position on the compressor case.

S 424-031

- (2) Install the bonding jumpers and the bolts (2).
  - (a) Tighten the bolts (2) to 50 inch-pounds (5.65 newton meters).

S 424-032

- (3) Remove all of the caps on the electrical connectors.

S 424-033

- (4) Connect the electrical plug (5) and the ignition lead (1) to the ignition unit (3).
  - (a) Tighten the ignition lead to 100-105 inch-pounds (11.3-11.9 newton meters).
  - (b) Install a lockwire to the ignition lead at the ignition unit.

EFFECTIVITY

ALL

**49-41-03**

01

Page 404  
Dec 22/08

S 744-014

- (5) Do this task: APU Control Unit - BITE Test (AMM 49-61-05/201).  
E. Put the Airplane Back to its Usual Condition

S 414-015

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.  
(c) Lift the left access door until the two APU access doors are approximately aligned.  
(d) Close the two APU access doors.  
(e) Close the four latches on the right access door.

S 864-016

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:  
(a) P49 APU Auxiliary Panel  
    1) 49C2, APU PRIME CONT  
    2) 49C3, APU START  
(b) P11 Overhead Panel  
    1) 11B35, APU ALTN CONT

S 864-018

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch.

S 864-019

- (4) Do this task: APU Starting and Operation (AMM 49-11-00/201).  
(a) Make sure the APU starts correctly.

S 864-021

- (5) If it is not necessary, do this task: APU Shutdown Procedure (AMM 49-11-00/201).

EFFECTIVITY

ALL

**49-41-03**

03

Page 405  
Aug 22/01

IGNITION LEAD - REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the ignition lead
  - (2) An installation of the ignition lead.
- B. The ignition lead connects the ignition unit to the igniter plug. The ignition lead is on the aft, bottom right side of the APU engine. You can get access to the ignition lead through the APU access doors.

TASK 49-41-04-004-001

2. Ignition Lead Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

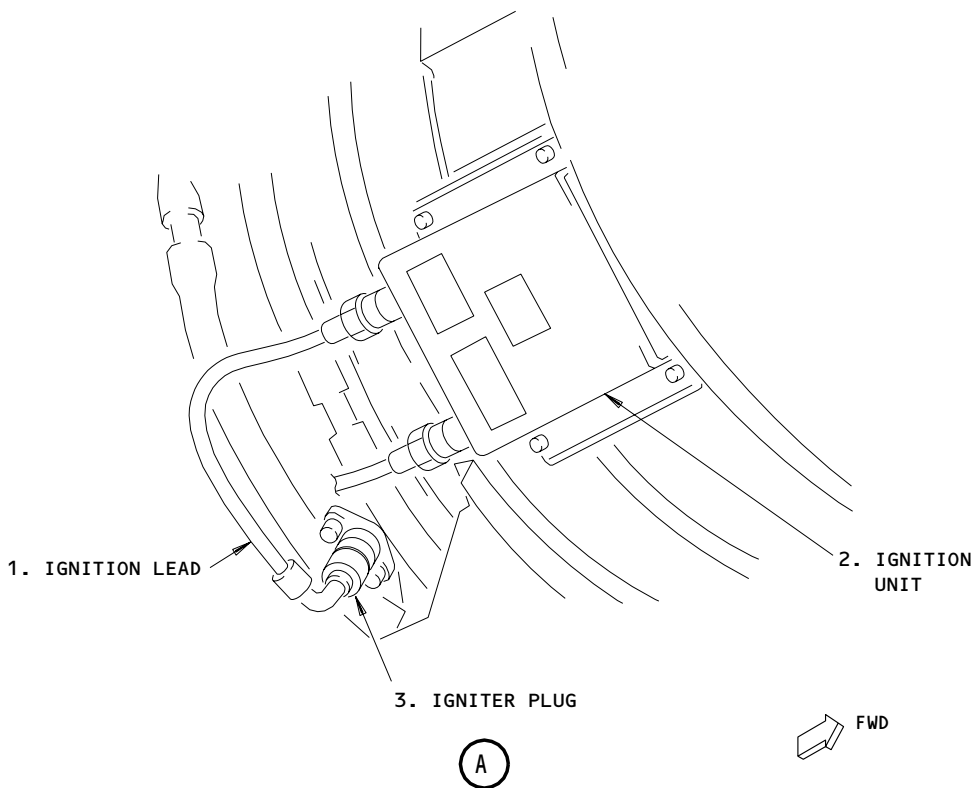
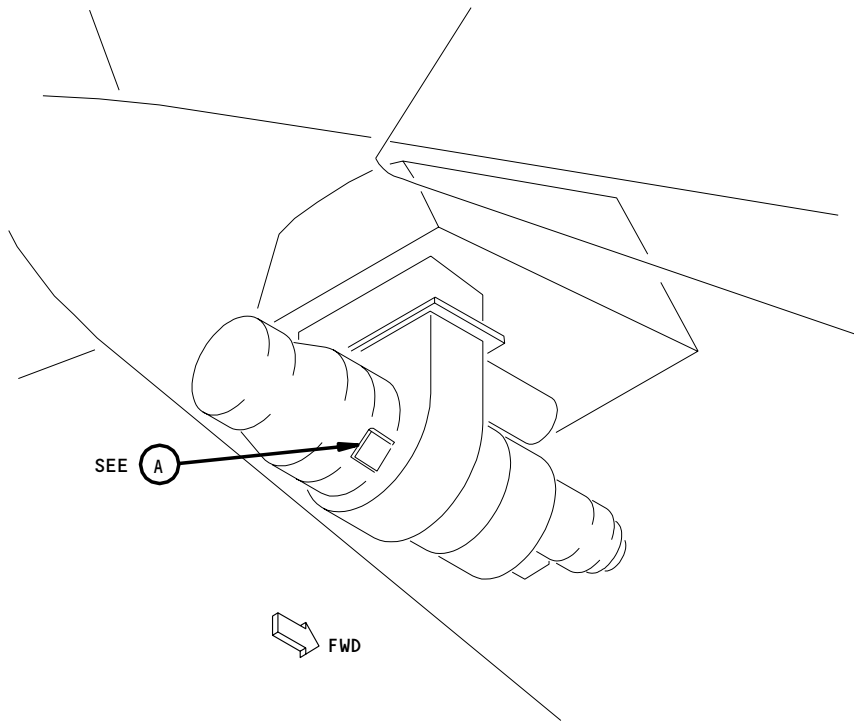
ALL

49-41-04

01

Page 401  
Dec 22/05





Ignition Lead Installation  
Figure 401

EFFECTIVITY	
	ALL

49-41-04

01

Page 402  
Apr 22/99

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the ignition lead:

WARNING: DO NOT TOUCH THE IGNITION COMPONENTS UNTIL YOU DO THESE STEPS. THESE STEPS WILL RELEASE THE HIGH VOLTAGE FROM THE IGNITION UNIT. IF YOU DO NOT OBEY THESE STEPS, INJURY TO PERSONS CAN OCCUR.

- (a) Release the high voltage in the ignition unit:
  - 1) Make sure a minimum of 5 minutes has gone by since the last APU start.
  - 2) Disconnect the ignition lead (1) from the igniter plug (3).
  - 3) Ground the ignition lead (1) to the APU engine.
- (b) Disconnect the ignition lead (1) from the ignition unit (2).

EFFECTIVITY

ALL

**49-41-04**

03

Page 403  
Aug 22/01

TASK 49-41-04-404-006

3. Ignition Lead Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Ignition Lead	49-41-00	01	20

B. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
 211 Flight Compartment - Left  
 212 Flight Compartment - Right  
 315 APU Compartment - Left  
 316 APU Compartment - Right

(2) Access Panels

315AL APU Access Door - Left  
 316AR APU Access Door - Right  
 822 Aft Cargo Door

C. Procedure

S 424-007

(1) Install the ignition lead:

- (a) Connect the ignition lead (1) to the ignition unit (2) and the igniter plug (3).
- 1) Tighten the coupling nuts on the ignition lead (1) to 100-105 inch-pounds (11.3-11.9 newton-meters).
- (b) Install a lockwire on the two ends of the ignition lead (1).

S 414-008

(2) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

EFFECTIVITY

ALL

49-41-04

02

Page 404  
Dec 22/08

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-41-04

04

Page 405  
Dec 22/08

IGNITION LEAD - INSPECTION/CHECK

1. General

- A. This procedure contains the following task:
  - (1) A inspection of the ignition lead.
- B. The ignition lead connects the ignition unit to the igniter plug. The ignition lead is on the aft, bottom right side of the APU engine. You can get access to the ignition lead through the APU access doors.

TASK 49-41-04-206-011

2. Ignition Lead Inspection

- A. Standard Tools and Equipment
  - (1) Tester - Fish Scale Pull, 0-10 pounds range, commercially available
- B. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 211 Flight Compartment - Left
    - 212 Flight Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right
    - 822 Aft Cargo Door
- C. Procedure
  - S 866-012
    - (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.
  - S 866-013
    - (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
      - (a) P11 Overhead Panel
        - 1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-41-04

01

Page 601  
Apr 22/02

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 016-014

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 826-020

- (4) Do a force test on the ignition lead:
  - (a) Loosen the coupling nut on the end of the ignition lead that connects to the igniter plug.
  - (b) Connect the tester to the end of the ignition lead.
  - (c) While you disconnect the ignition lead from the igniter plug, measure the force that is necessary to disconnect it.
    - 1) The force that is necessary to disconnect the ignition lead from the igniter plug must be a minimum of 1.0 pound (4.4 newtons).
  - (d) If the force used is less than 1.0 pound (4.4 newtons), replace the ignition lead.

S 216-016

- (5) Visually examine the ignition lead:
  - (a) Examine the fittings with threads to make sure the threads are not damaged.
  - (b) Examine the fittings, the elbows, and the conduit for cracks, deformation, damage, and wrench flats that are round.

EFFECTIVITY

ALL

49-41-04

03

Page 602  
Dec 22/04

- (c) If you do not find damage, connect the ignition lead to the igniter plug.
  - 1) Tighten the coupling nut to 100-105 inch-pounds (11.3-11.9 newton-meters).
  - 2) Install a lockwire on the coupling nut.
- (d) If you find damage, replace the ignition lead.

S 416-017

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 866-018

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 866-019

- (8) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-41-04

03

Page 603  
Aug 22/01

APU CRANK CONTACTOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the APU crank contactor.
- B. The APU crank contactor is in the aft cargo compartment on the P49 panel. You can get access to the crank contactor through the aft cargo door.

TASK 49-41-05-004-001

2. APU Crank Contactor Removal (Fig. 401)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right

(2) Access Panel

- 822 Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-004

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P33 Forward Miscellaneous Electronic Equipment Panel
    - 1) 33E5, APU BATTERY CHARGER
  - (c) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
    - 3) 49E4, APU BAT CHGR

EFFECTIVITY

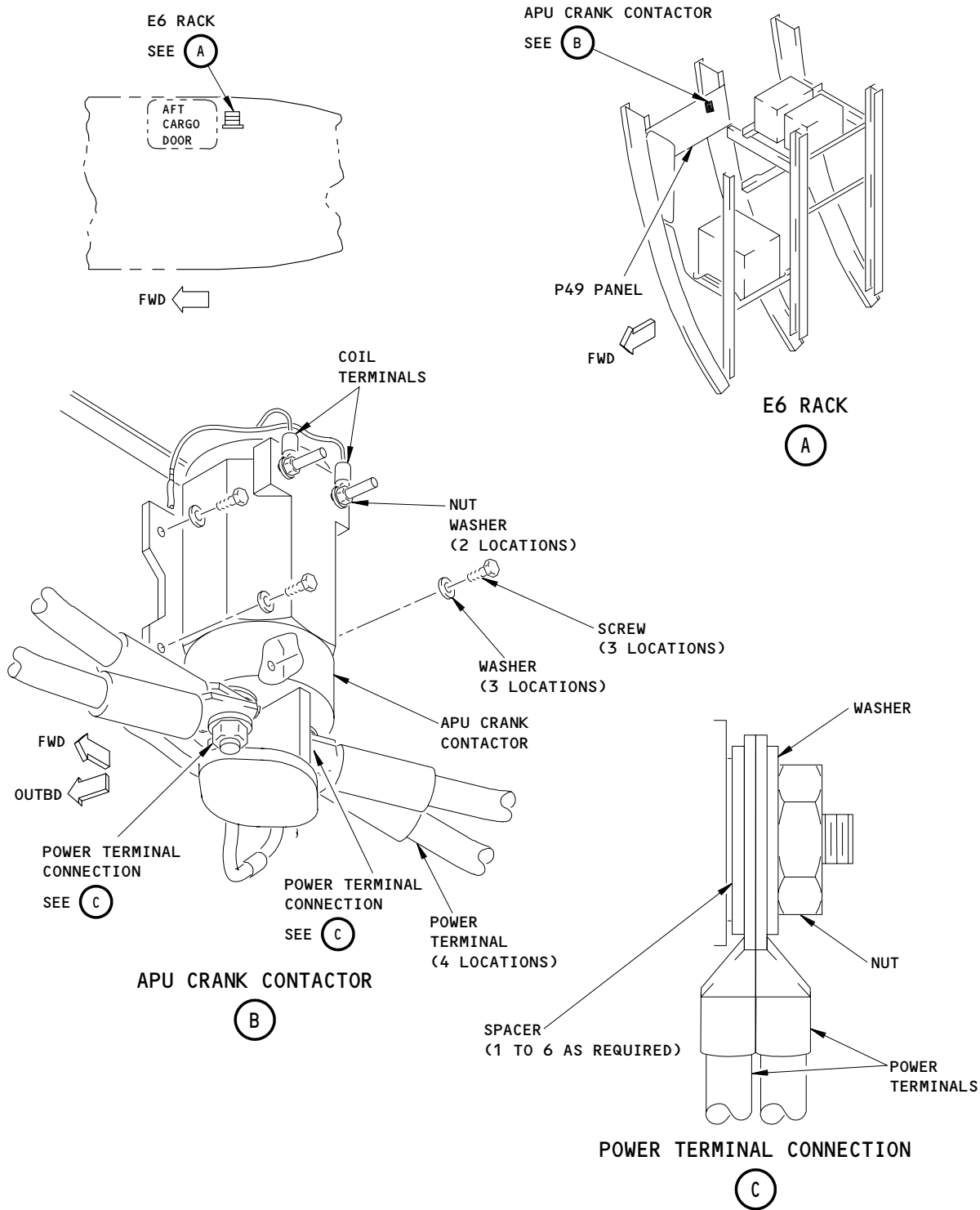
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49-41-05

03

Page 401  
Dec 22/03





APU Crank Contactor Installation  
Figure 401

EFFECTIVITY	ALL
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49-41-05

S 024-012

- (3) Do these steps to disconnect the electrical connector D300 from the APU battery:

**NOTE:** If the starter motor is being removed, the APU battery has been disconnected.

- (a) Open the access door on the front side of the E6 aft equipment center rack to get access to the APU battery.
- (b) Disconnect the electrical connector D300 from the APU battery.

S 024-019

- (4) Remove the APU crank contactor:
- (a) Remove the nuts and the washers from the terminals A1 and A2.
  - (b) Disconnect the power terminal cables from the terminals A1 and A2.
  - (c) Remove the nuts and the washers from the terminals X1 and X2.
  - (d) Disconnect the coil terminal cables from the terminals X1 and X2.
  - (e) Remove the screws and the washers that attach the APU crank contactor to the P49 panel.
  - (f) Remove the APU crank contactor from the P49 panel.

TASK 49-41-05-404-005

3. APU Crank Contactor Installation (Fig. 401)

A. References

- (1) AMM 20-10-21/601, Electrical Bonding
- (2) AMM 49-61-05/201, APU Control Unit

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right

EFFECTIVITY

ALL

49-41-05

02

Page 403  
Dec 22/07

- (2) Access Panel  
822 Aft Cargo Door

C. Procedure

S 024-020

- (1) Install the APU crank contactor:
- (a) Install the screws and the washers that attach the crank contactor to the P49 panel.
  - (b) Install one to six spacers on the crank contactor terminals to give clearance between the power terminal lugs and the contactor body.
  - (c) Connect the coil terminal cables to the X1 and the X2 terminals with the nuts and the washers.
    - 1) Tighten the nuts to 23-26 inch-pounds (2.6-2.9 newton-meters).
  - (d) Connect the power terminal cables to the A1 and the A2 terminals with the nuts and the washers.
    - 1) Tighten the nuts to 107-117 inch-pounds (12.1-13.2 newton-meters).

S 284-007

- (2) Do a check of the bonding resistance between the P49 panel and the crank contactor (AMM 20-10-21/601).
- (a) The resistance must not be more than 0.0025 ohms.

S 424-013

- (3) Do these steps to connect the electrical connector D300 to the APU battery:

**NOTE:** If the starter motor is being removed, do not connect the APU battery.

- (a) Connect the electrical connector D300 to the APU battery.
- (b) Close the access door on the front side of the E6 aft equipment center rack.

EFFECTIVITY

ALL

49-41-05

01

Page 404  
Dec 22/07

S 734-008

- (4) Do this task: APU Control Unit - Self Test (AMM 49-61-05/201).

S 864-009

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

3) 49E4, APU BAT CHGR

(b) P33 Forward Miscellaneous Electronic Equipment Panel

1) 33E5, APU BATTERY CHARGER

(c) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 864-010

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

**49-41-05**

02

Page 405  
Apr 22/07

STARTER CLUTCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the Starter Clutch
  - (2) An installation of the Starter Clutch.
- B. Use this procedure for the starter clutch that assembles in the gearbox. You must remove the APU starter motor to get access to the starter clutch. The starter motor is on the APU gearbox below the cooling fan.
- C. You can get access to the APU starter motor through the APU access doors.

TASK 49-41-06-004-001-001

2. Starter Clutch Removal (Fig. 401, Fig. 402, Fig. 403)

- A. References
  - (1) AMM 49-41-01/401, Starter Motor
- B. Special Tools and Equipment
  - (1) 298096-2 Puller - Starter Clutch, Garrett Airline Services Division, Garrett Corporation, P.O. Box 29003, Phoenix, AZ 85072
- C. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right
    - 822 Aft Cargo Door
- D. Procedure

S 864-002-001

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

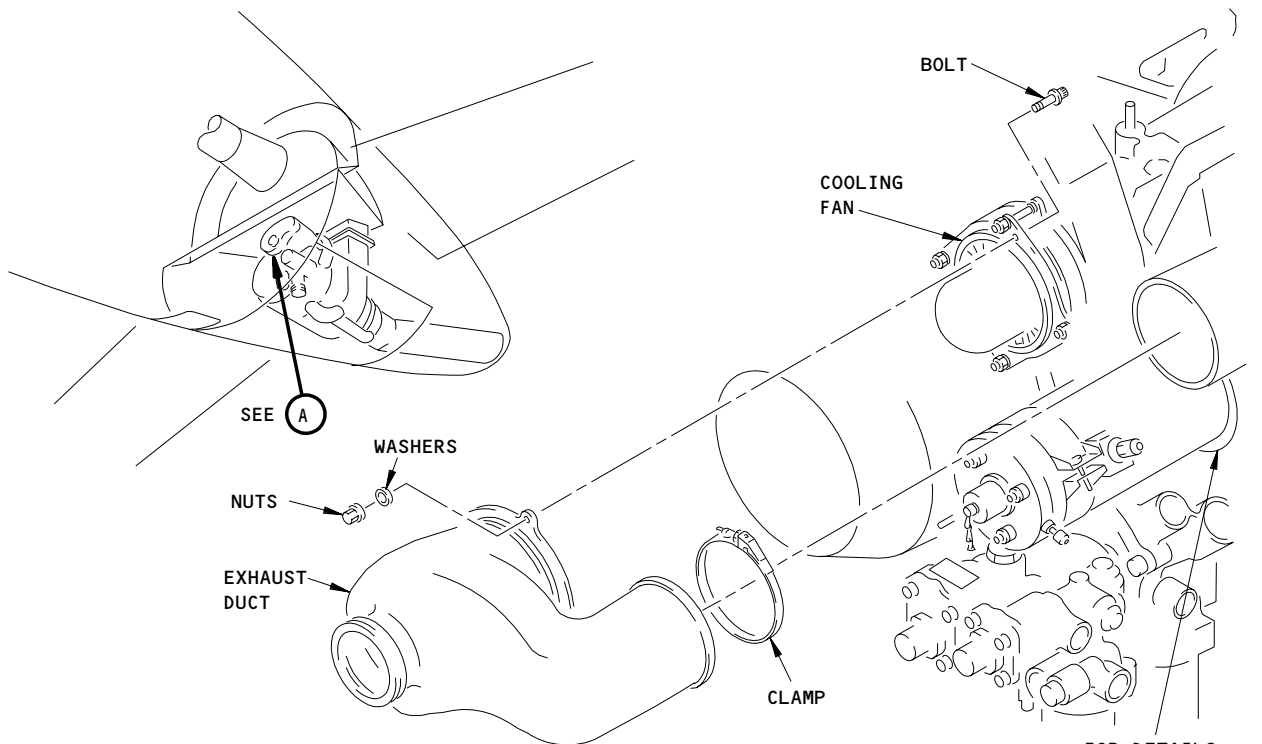
S 864-003-001

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

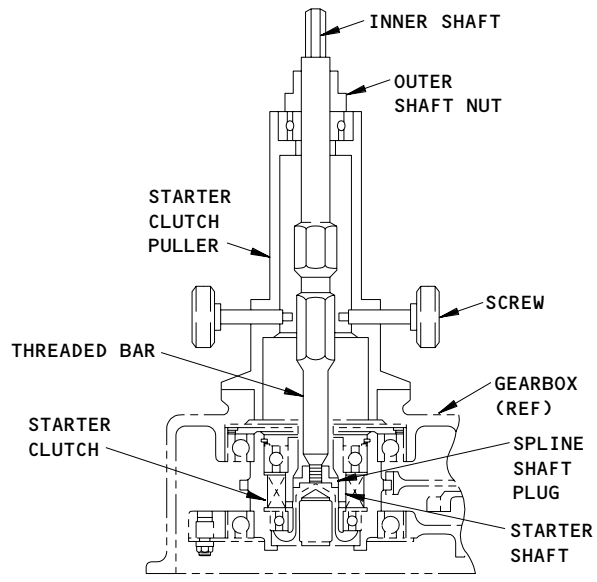
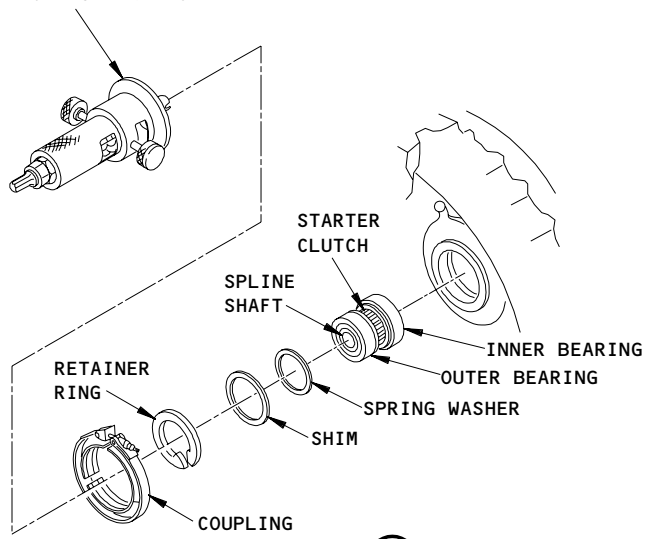
**49-41-06**  
CONFIG 1  
Page 401  
Aug 22/01

01



FOR DETAILS OF STARTER CLUTCH ASSEMBLY SEE (B)

STARTER CLUTCH PULLER (SEE (C) FOR SECTIONAL VIEW OF PULLER INSTALLED)



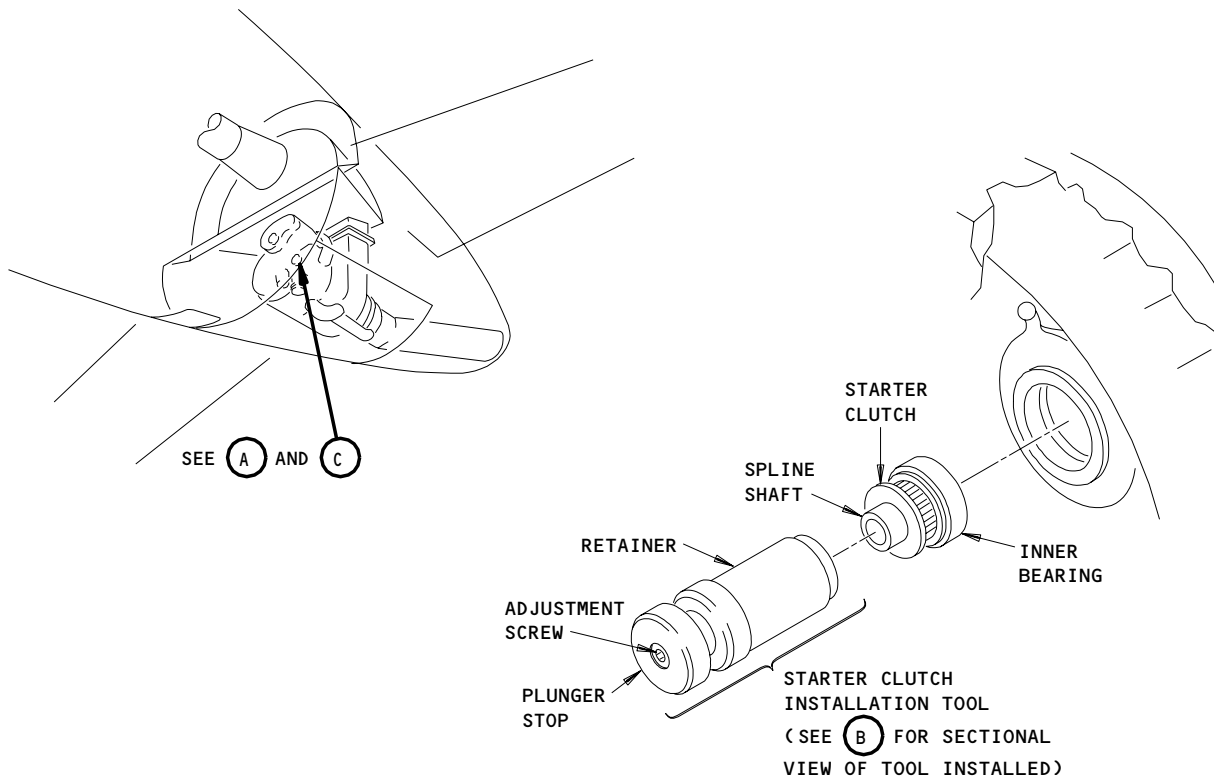
Starter Clutch Installation  
Figure 401

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

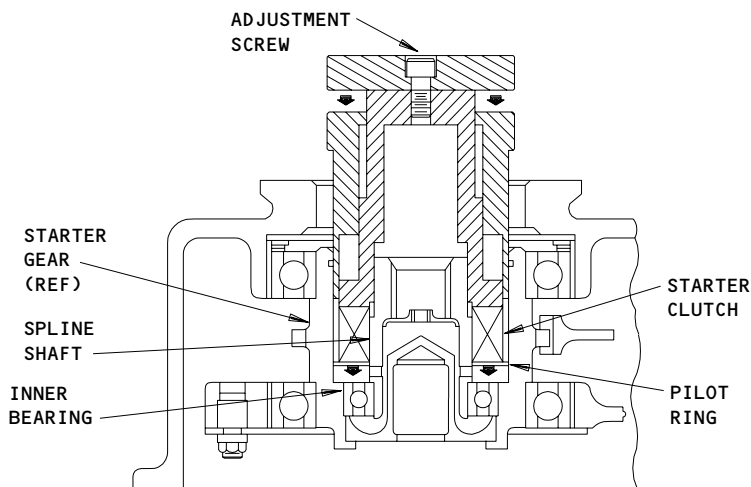
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CONFIG 1  
Page 402  
Dec 22/07

01

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(A)



(B)

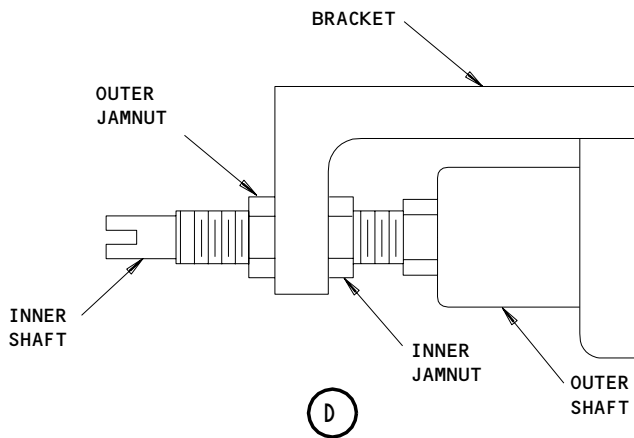
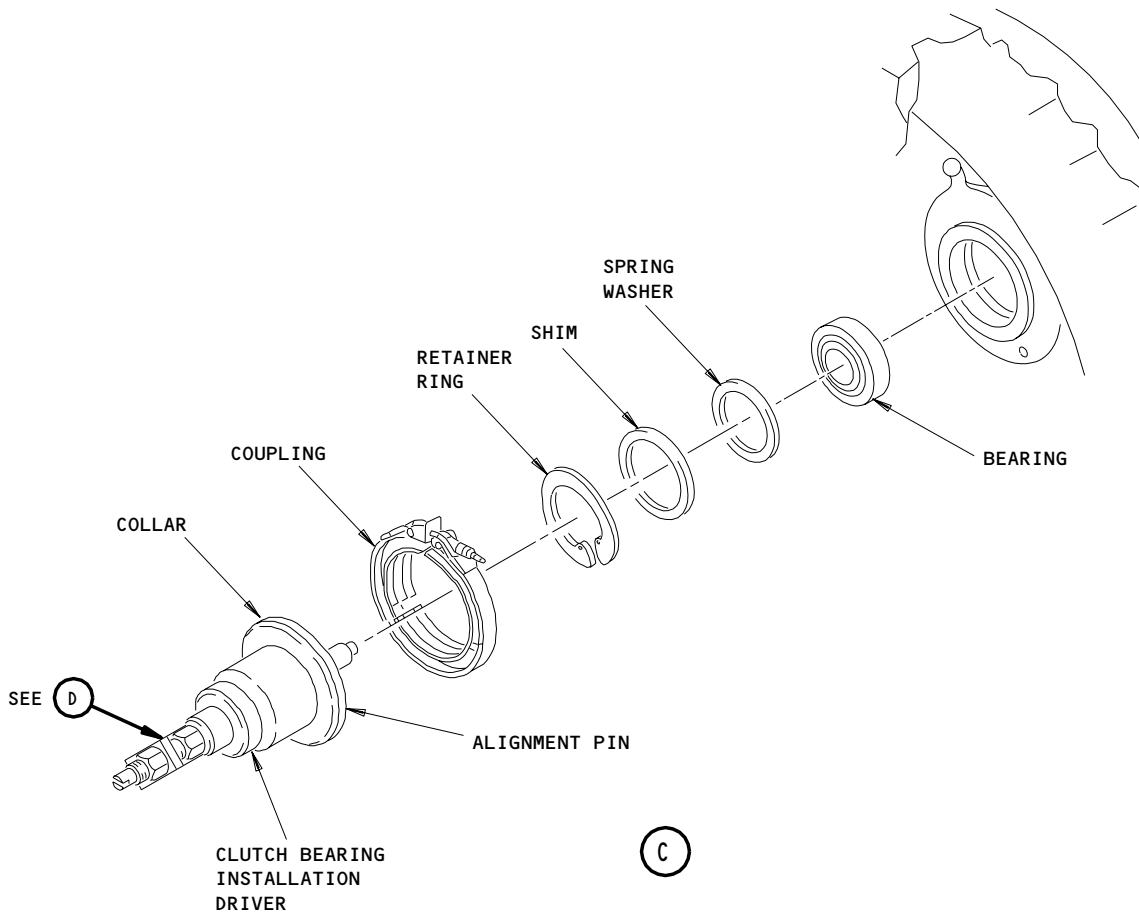
Starter Clutch Installation  
Figure 402 (Sheet 1)

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**

CONFIG 1  
Page 403  
Aug 22/01

01



Starter Clutch Installation  
Figure 402 (Sheet 2)

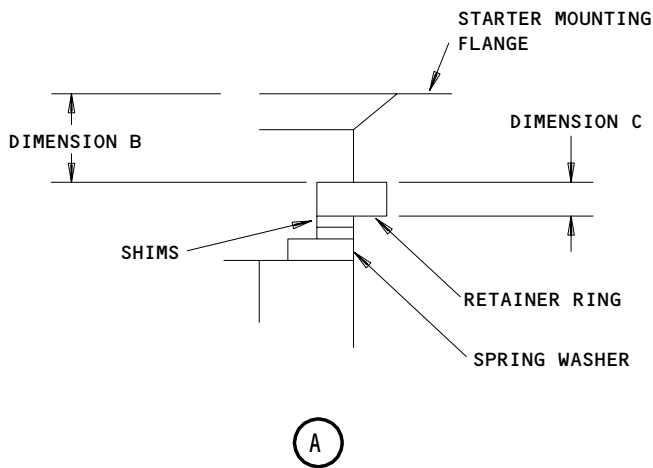
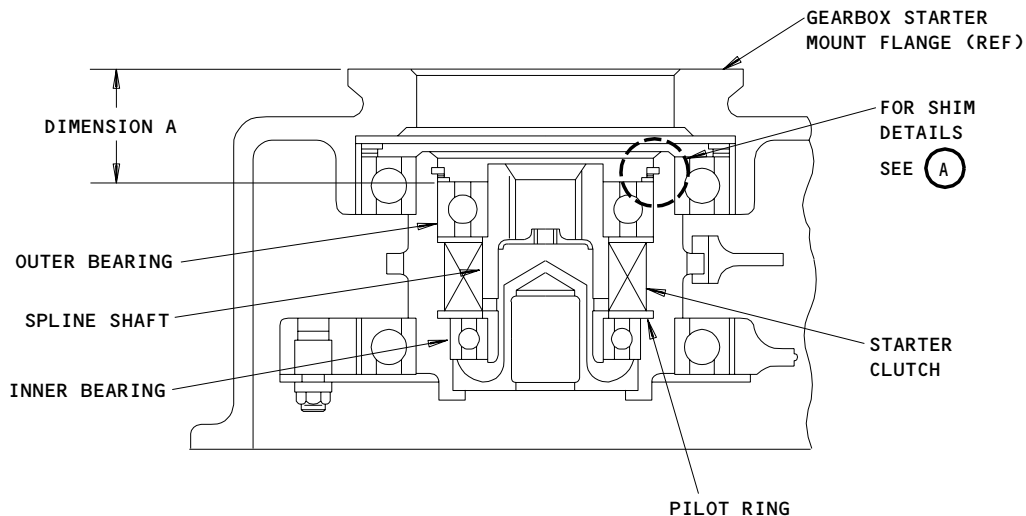
EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**

CONFIG 1  
Page 404  
Aug 22/01

01





Starter Clutch Shim Installation  
Figure 403

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**

CONFIG 1  
Page 405  
Aug 22/01

01

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004-001

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-040-001

- (4) Remove the exhaust duct for the cooling fan (Fig. 401):
  - (a) Loosen the clamp on the exhaust duct.
  - (b) Remove the bolts, the nuts, and the washers at the cooling fan.
  - (c) Remove the exhaust duct for the cooling fan.

S 024-041-001

- (5) Do this task: Starter Motor Removal (AMM 49-41-01/401).

S 024-007-001

- (6) Remove the starter clutch:
  - (a) Measure the distance between the starter mounting flange and the outer edge of the retainer ring.
    - 1) Write the distance as dimension B (Ref Fig. 403).
  - (b) Remove the retainer ring, the shims, and the spring washer.
    - 1) Discard the spring washer.
  - (c) Make sure the threaded bar for the starter clutch is fully retracted.
  - (d) Attach the starter clutch puller to the gearbox face with the coupling.

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 1  
Page 406  
Aug 22/01

03

- (e) Turn the inner shaft of the clutch puller clockwise until the threaded bar is in the spline shaft plug.
- (f) Tighten the setscrews against the shaft to hold the shaft in its position.
- (g) Slowly turn the outer shaft nut clockwise to remove the assembled starter clutch from the gearbox.
- (h) Remove the coupling and the clutch puller from the gearbox.

TASK 49-41-06-404-008-001

3. Starter Clutch Installation (Fig. 401, Fig. 402, Fig. 403)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-41-01/401, Starter Motor

B. Special Tools and Equipment

- (1) 833052-1 Driver - Starter Clutch Bearing Installation, Garrett Airline Services Division, Garrett Corporation, P.O. Box 29003, Phoenix, AZ 85072
- (2) 291051-1 Tool - Starter Clutch Installation, Garrett Airline Services, Garrett Corporation, P.O. Box 29003, Phoenix, AZ 85072

C. Consumable Materials

- (1) B00309 Solvent - Alcohol-Isopropyl, commercial grade
- (2) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301)
- (3) G01043 Cloth - Lintfree

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**

CONFIG 1  
Page 407  
Dec 22/02

01

E. Procedure

S 114-009-001

- (1) Clean the starter clutch area:
- (a) Use a small magnet and a scribe to remove the metal particles from the starter clutch area.
    - 1) Make sure you remove the metal particles from the retainer ring groove and the oil groove.

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, HEAT, AND FLAME. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (b) Clean the starter clutch area with the lintfree cloth made moist with the solvent.
- (c) Dry the starter clutch area with a clean cloth.

S 214-010-001

- (2) Visually examine the inner diameter of the starter gear area for pitting, chips, and other damage.

**NOTE:** The surface must be smooth to prevent damage to the new clutch.

S 424-011-001

- (3) Install the starter clutch:

**CAUTION:** MAKE SURE YOU INSTALL THE NEW SPLINE SHAFT AND THE NEW BEARINGS FOR THE CLUTCH. DAMAGE TO THE NEW CLUTCH CAN OCCUR IF YOU USE THE USED PARTS.

- (a) Temporarily install the new inner bearing in the spline shaft.
  - 1) Make sure the spline shaft extends approximately 0.04 inch (1.0 mm) more than the bearing.

**NOTE:** This will make sure the bearing is installed on the spline shaft correctly.

- (b) Remove the inner bearing from the spline shaft.
- (c) Lubricate the starter clutch, the spline shaft, and the inner bearing with engine oil.
- (d) Install the starter clutch on the spline shaft:
  - 1) Hold the shaft such that you look at the end of the shaft with the splines.
  - 2) Make sure the arrow on the inner race of the starter clutch points counterclockwise.

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 1  
Page 408  
Aug 22/01

01

- 3) Install the starter clutch on the spline shaft in this position.
- (e) Install the inner bearing on the spline shaft with the word OUT on the clutch side of the shaft.

NOTE: You can use your fingers to close the clutch sprags.

- (f) Put the spline shaft, with the clutch and the bearing, in the installation tool for the starter clutch.

CAUTION: DO NOT PUSH THE PLUNGER PART OF THE INSTALLATION TOOL WHEN YOU PUT THE CLUTCH IN THE GEARBOX. THIS CAN CAUSE THE CLUTCH ASSEMBLY TO COME OUT OF THE GEARBOX. DAMAGE TO THE CLUTCH ASSEMBLY CAN OCCUR.

- (g) Put the clutch installation tool, with the clutch assembly, in the starter gear area until the tool leading edge stops on the starter gear.
- (h) Hold the tool with the retainer and push the plunger part of the tool in the starter gear area until the starter clutch stops.
- (i) Slowly remove the clutch installation tool to make sure you do not change the position of the clutch.

CAUTION: MAKE SURE THE CLUTCH DOES NOT COME OUT OF THE GEAR AREA. THE TANGS WILL DISENGAGE IF THE YOU LET THE CLUTCH COME OUT. IF THE TANGS DISENGAGE, YOU MUST DO THE CLUTCH INSTALLATION TASK AGAIN.

- (j) Turn the clutch clockwise with your fingers to make sure it moves freely and smoothly.
- (k) Install the outer bearing:
  - 1) Lubricate the outer bearing with engine oil.
  - 2) Make sure the word OUT, on the bearing, points away from the clutch.
  - 3) Install the bearing on the spline shaft.
  - 4) Push tightly on the bearing until the bearing stays in its position.
  - 5) Loosen the jamnuts on the inner shaft of the installation tool for the clutch bearing.
  - 6) Retract the inner and the outer shafts.
  - 7) Put the bearing installation tool on the gearbox starter flange.
    - a) Make sure the pin on the collar of the bearing installation tool engages the pin hole of the starter flange.
  - 8) Turn the inner shaft of the bearing installation tool clockwise in the threaded plug until it stops.

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 1  
Page 409  
Aug 22/01

01

 **BOEING**  
767  
MAINTENANCE MANUAL

- 9) Attach the bearing installation tool to the starter flange with the coupling.
  - 10) Turn the inner jamnut counterclockwise with your hand until it is tight against the bracket.
  - 11) Turn the outer jamnut clockwise with your hand until it is tight against the bracket.
  - 12) Turn the outer shaft of the installation tool until the shaft stops and the bearing is installed.
  - 13) Loosen the jamnuts and retract the inner and the outer shafts of the installation tool.
  - 14) Remove the coupling and the installation tool from the starter flange.
  - 15) Measure the clearance between the bearing face and the retainer ring groove to make sure the bearing is fully installed.
    - a) There must be a clearance of approximately 0.08 inch (2.0 mm) between the bearing face and the groove.
- (L) Calculate the shims that are necessary for a tight fit (Fig. 403):
- 1) Measure the distance between the mounting flange for the starter motor and the outer face of the outer bearing.
    - a) Write this as dimension A.
  - 2) Measure the width of the retainer ring.
    - a) Write this as dimension C.
  - 3) Subtract dimension B (measured before the clutch removal), dimension C, and 0.043 ±0.005 inch (1.1 ±0.13 mm) from dimension A.
  - 4) The result is the shim thickness that is necessary for a tight fit.

NOTE: It is recommended that you do the calculation again for the thickness of washers.

CAUTION: MAKE SURE YOU PUT THE SHIMS AND THE WASHER IN THE CENTER OF THE INNER DIAMETER OF THE RETAINER RING. DAMAGE TO THE STARTER MOTOR CAN OCCUR IF THEY ARE INSTALLED INCORRECTLY.

- (m) Install the spring washer and the shims.
- (n) Install the retainer ring in the groove in the gearbox.
- (o) Turn the clutch clockwise to make sure it turns freely and smoothly.

S 424-047-001

- (4) Do this task: Starter Moter Installation (AMM 49-41-01/401).

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 1  
Page 410  
Aug 22/01

01

S 424-042-001

- (5) Install the exhaust duct for the cooling fan (Fig. 401):
- (a) Install the clamp on the exhaust part of the exhaust duct.
  - (b) Install the exhaust duct on the oil cooler port.
    - 1) Tighten the clamp to 25-30 inch-pounds (2.8-3.4 newton-meters).
  - (c) Install the bolts, the washers, and the nuts at the cooling fan.
    - 1) Tighten the nuts to 40-50 inch-pounds (4.5-5.7 newton meters).

S 864-014-001

- (6) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-015-001

- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 714-016-001

- (8) Do an operational test of the starter clutch:
- (a) Remove the end cap on the starter motor.

**CAUTION:** IMMEDIATELY STOP THE APU IF THE STARTER DOES NOT DISENGAGE FROM THE CLUTCH AT THE APU OPERATION SPEED. EXAMINE THE CLUTCH ASSEMBLY. THE STARTER CAN BE DAMAGED IF IT CONTINUES TO TURN AT HIGH SPEEDS.

- (b) Do this task: APU Starting and Operation (AMM 49-11-00/201).
- (c) During the APU operation, make sure the starter motor does not turn when the APU is at operation speed.
- (d) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- (e) Install the end cap on the starter motor.

S 414-017-001

- (9) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 1  
Page 411  
Aug 22/01

03

 **BOEING**  
767  
MAINTENANCE MANUAL

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**

CONFIG 1  
Page 412  
Aug 22/01

01



STARTER CLUTCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the Starter Clutch
  - (2) An installation of the Starter Clutch.
- B. This procedure is for the one piece clutch which attaches to the APU gearbox with five screws. The starter then attaches to the adapter part of the starter clutch. This type of starter clutch is on the APU which has a gearbox with a part number of 3862180-13 or -19. Garrett Service Bulletin GTCP331-49-5714 installs this new starter clutch on the APU that does not have it installed. The gearbox part number is on the front face of the gearbox, below the APU generator.
- C. You must remove the APU starter motor to get the access to the starter clutch assembly. The starter motor is on the APU gearbox below the cooling fan. You can get access to the APU starter motor through the APU access doors.

TASK 49-41-06-004-001-002

2. Starter Clutch Removal (Fig. 401)

A. References

- (1) AMM 49-41-01/401, Starter Motor

B. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

C. Procedure

S 864-002-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003-002

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY  
APU WITH GEARBOX 3862180-13 OR -19

**49-41-06**

CONFIG 2

01

Page 401

Aug 22/01

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004-002

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 014-005-002

- (4) Remove the exhaust duct from the cooling fan:
  - (a) Remove the clamp from the exhaust duct.
  - (b) Remove the bolts, the nuts, and the washers from the cooling fan.
  - (c) Remove the exhaust duct.

S 024-020-002

- (5) Do this task: Starter Motor Removal (AMM 49-41-01/401).

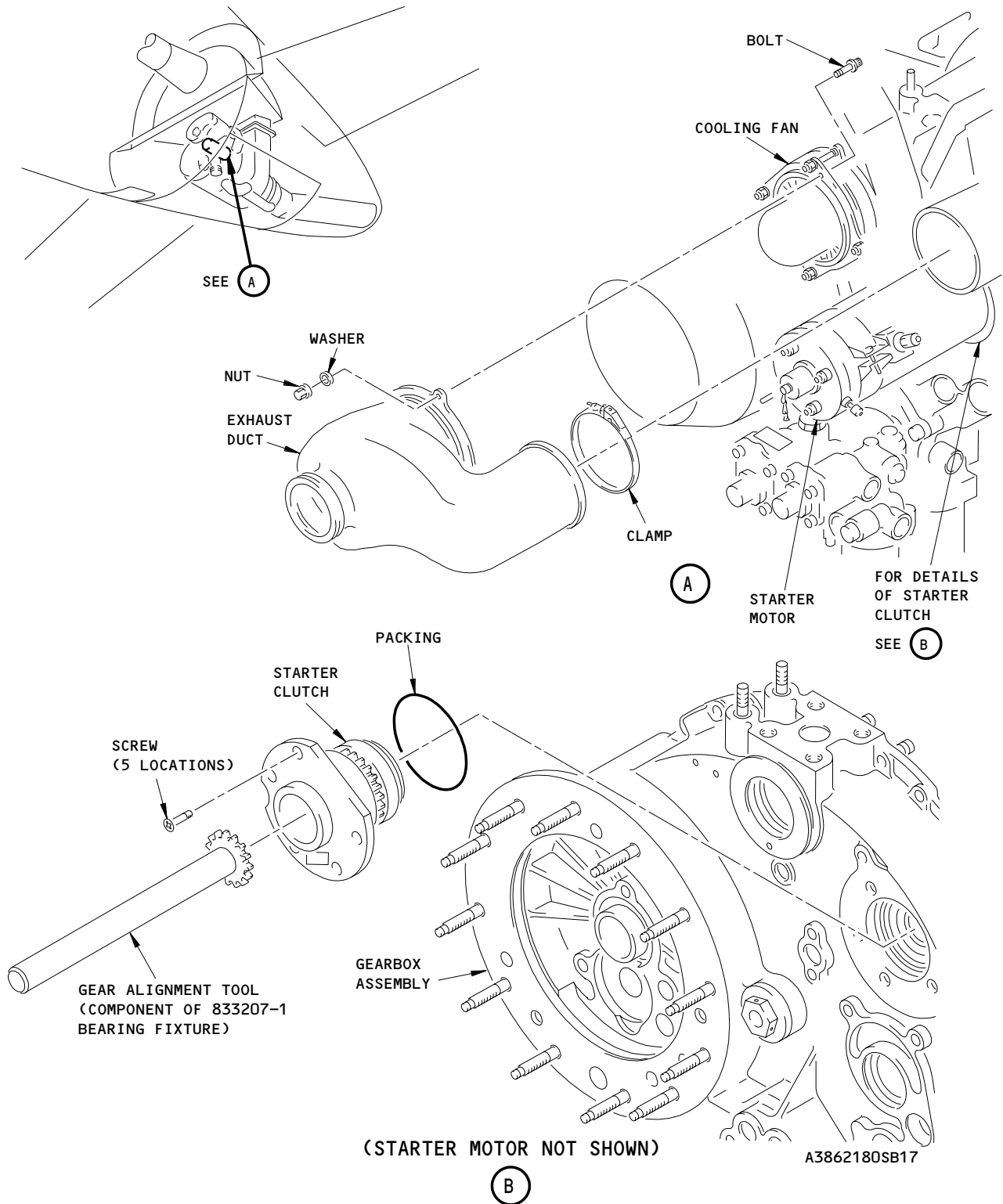
S 024-007-002

- (6) Remove the starter clutch:
  - (a) Remove the screws that attach the starter clutch to the gearbox.
  - (b) Remove the starter clutch from the gearbox.

EFFECTIVITY  
APU WITH GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 2  
Page 402  
Aug 22/01

03



Starter Clutch Installation  
Figure 401

EFFECTIVITY  
APU WITH GEARBOX 3862180-13 OR -19

**49-41-06**

CONFIG 2  
Page 403  
Dec 22/07

01

- (c) If you cannot remove the starter clutch, do these steps to remove the starter clutch with the starter motor:
- 1) Align the pin on the starter motor with the hole in the mounting flange and attach the starter motor to the mounting flange with the coupling.
  - 2) Loosen the starter clutch with the starter motor.

**CAUTION:** DO NOT COMPLETELY REMOVE THE STARTER CLUTCH FROM THE GEARBOX HOUSING WITH THE STARTER MOTOR STILL ATTACHED. THE STARTER CLUTCH COULD DISASSEMBLE AND BE DAMAGED.

- 3) Remove the coupling and the starter motor from the mounting flange.
  - 4) Remove the starter clutch from the gearbox.
- (d) Remove the packing from the starter clutch.
- 1) Discard the packing.

TASK 49-41-06-404-008-002

3. Starter Clutch Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-41-01/401, Starter Motor

B. Special Tools and Equipment

- (1) 833207-1 Fixture - Bearing, Gear Alignment Tool, a component of the fixture, Garrett Airline Services Division, Garrett Corporation, P.O. Box 29003, Phoenix, AZ 85072

C. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

D. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Starter Clutch Packing	49-41-06	02	10 15

E. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

EFFECTIVITY \_\_\_\_\_  
APU WITH GEARBOX 3862180-13 OR -19

49-41-06

CONFIG 2  
Page 404  
Aug 22/05

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

F. Procedure

S 424-009-002

- (1) Install the starter clutch:
  - (a) Lubricate the new packing with a light coat of lubricant or oil.
  - (b) Install the packing on the starter clutch.
  - (c) Use the gear alignment tool to align the starter gear while you install the starter clutch in the gearbox.
  - (d) Attach the starter gear assembly with the screws.
    - 1) Tighten the screws to 110-115 inch-pounds (12.4-13.0 newton-meters).
  - (e) Turn the starter clutch clockwise to make sure the clutch turns freely and smoothly.

S 424-021-002

- (2) Do this task: Starter Motor Installation (AMM 49-41-01/401).

S 424-022-002

- (3) Install the exhaust duct for the cooling fan:
  - (a) Put the clamp on the exit side of the exhaust duct.
  - (b) Put the exhaust duct on the cooling fan.
    - 1) Tighten the clamp to 25-30 inch-pounds (2.8-3.4 newton-meters).
  - (c) Install the bolts, the washers, and the nuts at the cooling fan.
    - 1) Tighten the nuts to 40-50 inch-pounds (4.5-5.6 newton-meters).

S 864-012-002

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

EFFECTIVITY  
APU WITH GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 2  
Page 405  
Aug 22/05

05

- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-013-002

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 714-014-002

- (6) Do an operational test for the starter clutch:
  - (a) Remove the cap from the end of the starter motor.

**CAUTION:** STOP THE APU IMMEDIATELY IF THE STARTER DOES NOT DISENGAGE WHEN THE APU IS AT OPERATION SPEED. EXAMINE THE STARTER CLUTCH. THE STARTER CAN BE DAMAGED IF IT CONTINUES TO TURN AT HIGH SPEEDS.

- (b) Do this task: APU Starting and Operation (AMM 49-11-00/201).
- (c) During the APU operation, make sure the starter motor does not turn when the APU is at operation speed.
- (d) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- (e) Install the cap on the end of the starter motor.

S 414-015-002

- (7) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY \_\_\_\_\_  
APU WITH GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 2  
Page 406  
Aug 22/01

01

STARTER CLUTCH - INSPECTION/CHECK

1. General

- A. This procedure contains this task:
  - (1) A inspection of the Starter Clutch.
- B. Use this procedure for the starter clutch that assembles in the gearbox. You must remove the APU starter motor to get access to the starter clutch. The starter motor is on the APU gearbox below the cooling fan.
- C. You can get access to the APU starter motor through the APU access doors.

TASK 49-41-06-206-036-001

2. Starter Clutch Inspection

- A. References
  - (1) AMM 49-41-01/401, APU Starter Motor
- B. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment - Right
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right

C. Procedure

- S 016-037-001
  - (1) Do this task: Starter Motor Removal (AMM 49-41-01/401).
- S 216-038-001
  - (2) Visually examine the starter clutch:
    - (a) Examine the starter clutch to make sure it is sufficiently lubricated.
    - (b) Examine the clutch sprag area for signs of pitting, chips, and other damage.
    - (c) Turn the starter clutch clockwise to make sure the clutch moves freely and smoothly.
      - 1) A rough movement gives an indication of worn areas on the bearing and the clutch sprag.
    - (d) Turn the starter clutch counterclockwise to make sure the clutch tightly engages the starter drive gear.
- S 416-039-001
  - (3) Do this task: Starter Motor Installation (AMM 49-41-01/401).

EFFECTIVITY  
APU WITHOUT GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 1  
Page 601  
Aug 22/01

01

STARTER CLUTCH - INSPECTION/CHECK

1. General

- A. This procedure contains this task:
  - (1) A inspection of the Starter Clutch.
- B. This procedure is for the one piece clutch assembly which attaches to the APU gearbox with five screws. The starter then attaches to the adapter part of the starter clutch. This type of starter clutch is on the APU which has a gearbox with a part number of 3862180-13 or -19. Garrett Service Bulletin GTCP331-49-5714 installs this new starter clutch on the APU that does not have it installed. The gearbox part number is on the front face of the gearbox, below the APU generator.
- C. You must remove the APU starter motor to get the access to the starter clutch. The starter motor is on the APU gearbox below the cooling fan. You can get access to the starter motor through the APU access doors.

TASK 49-41-06-206-016-002

2. Starter Clutch Inspection

- A. References
  - (1) AMM 49-41-01/401, Starter Motor
- B. Equipment
  - (1) 833207-1 Fixture - Bearing, Gear Alignment Tool, a component of the fixture  
Garrett Airline Services Division, Garrett Corporation  
P.O. Box 29003  
Phoenix, AZ 85072
- C. Access
  - (1) Location Zones
    - 315 APU Compartment - Left
    - 316 APU Compartment - Right
  - (2) Access Panels
    - 315AL APU Access Door - Left
    - 316AR APU Access Door - Right
- D. Procedure
  - S 016-017-002
  - (1) Do this task: Starter Motor Removal (AMM 49-41-01/401).
  - S 216-018-002
  - (2) Visually examine the starter clutch:
    - (a) Examine the starter clutch to make sure it is sufficiently lubricated.
    - (b) Examine the starter clutch for chips, pitting, and other damage on the starter clutch surface.
    - (c) Use the gear alignment tool to turn the starter clutch clockwise to make sure it turns freely and smoothly.
    - (d) Use the gear alignment tool to turn the starter clutch counterclockwise to make sure it engages.

EFFECTIVITY  
APU WITH GEARBOX 3862180-13 OR -19

**49-41-06**  
CONFIG 2  
Page 601  
Dec 22/03

01



 **BOEING**  
767  
MAINTENANCE MANUAL

- S 426-020-002  
(3) Do this task: Starter Motor Installation (AMM 49-41-01/401).

EFFECTIVITY  
APU WITH GEARBOX 3862180-13 OR -19

01

**49-41-06**  
CONFIG 2  
Page 602  
Aug 22/01

APU CONTROL PANEL – REMOVAL/INSTALLATION

1. General

- A. This procedure has these tasks:
  - (1) A removal of the APU control panel
  - (2) An installation of the APU control panel.
- B. The APU control panel, M1, is installed on the P5 overhead panel. You can get access to the APU control panel in the flight compartment.

TASK 49-41-81-004-001

2. APU Control Panel Removal (Fig. 401)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right

(2) Access Panels

- 822 Aft Cargo Door

B. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-015

- (2) Make sure the BAT switch on the P5 overhead panel is OFF.

S 864-003

- (3) Open these circuit breakers and attach DO-NOT-CLOSE tags:

(a) P11 Overhead Panel

- 1) 11A33, CB-1, IND LTS
- 2) 11B35, APU ALTN CONT

(b) P49 APU Auxiliary Panel

- 1) 49C2, APU PRIME CONT
- 2) 49C3, APU START

C. APU Control Panel Removal

S 024-014

- (1) Do these steps to remove the APU control panel, M1:

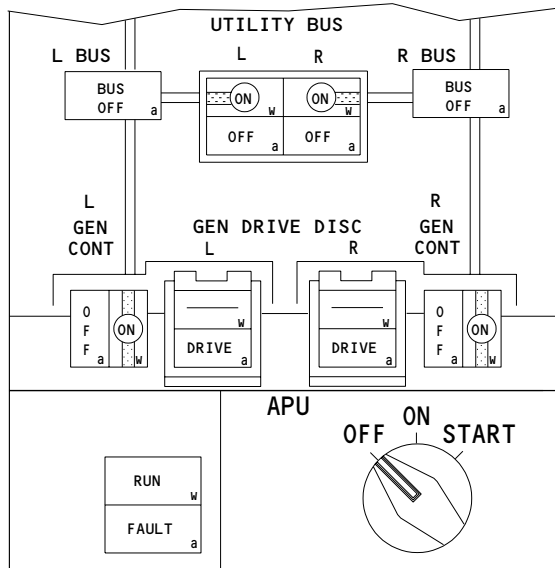
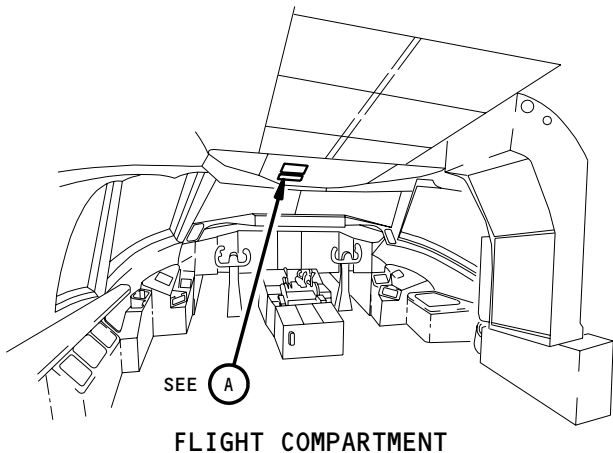
EFFECTIVITY

ALL

49-41-81

04

Page 401  
Dec 22/05

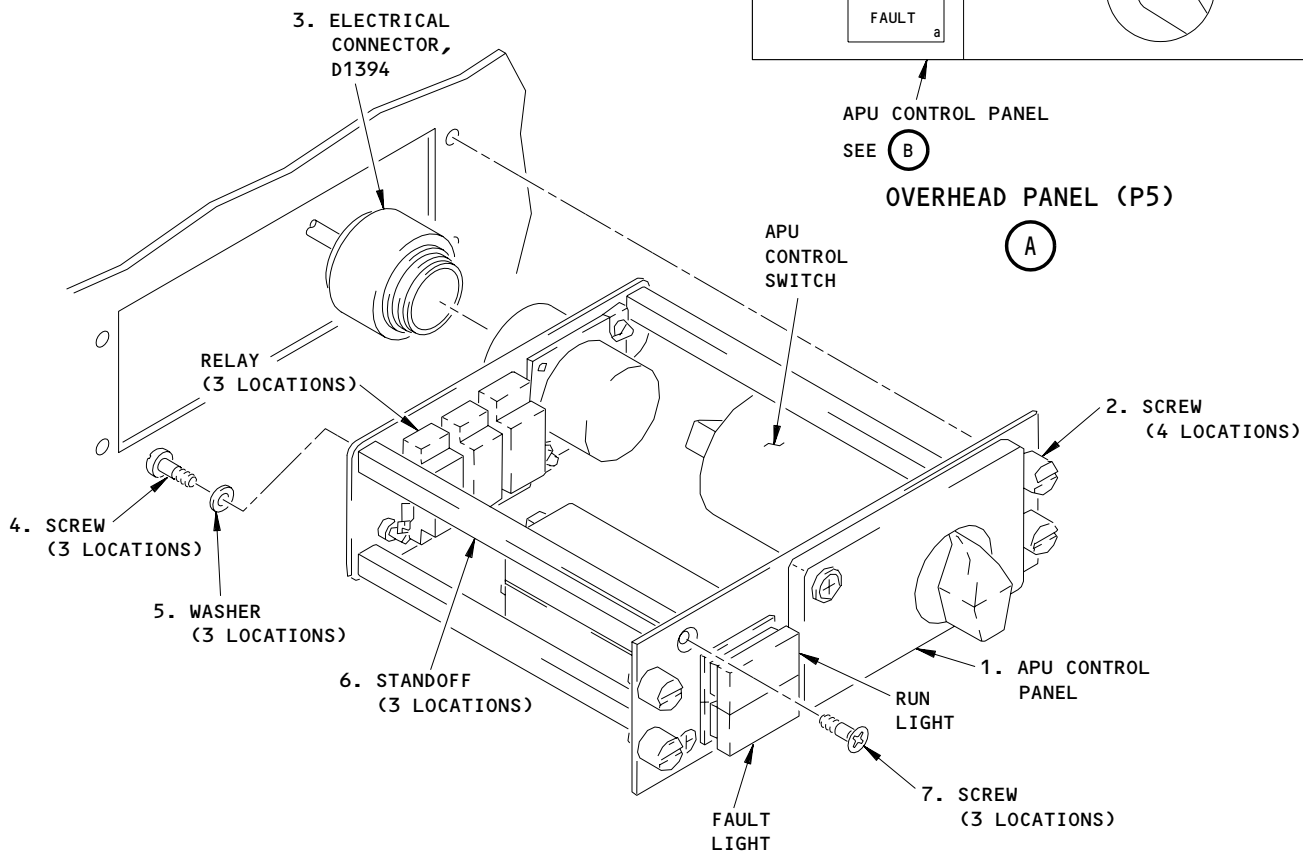


APU CONTROL PANEL

SEE **(B)**

OVERHEAD PANEL (P5)

**(A)**



APU CONTROL PANEL  
(INTERNAL WIRES NOT SHOWN)

**(B)**

APU Control Panel Installation  
Figure 401

EFFECTIVITY

ALL

49-41-81

01

Page 402  
Dec 22/05

- (a) Loosen the four screws (2) until you can disengage the APU control panel (1) from the P5 overhead panel.
- (b) Carefully pull the APU control panel (1) from the P5 overhead panel until you can see the electrical connector D1394 (3).
- (c) Disconnect the electrical connector D1394 (3) from the APU control panel (1).
- (d) Remove the APU control panel (1).
- (e) Make sure you install all necessary protection covers.

TASK 49-41-81-404-007

3. APU Control Panel Installation (Fig. 401)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit

B. Consumable Materials

- (1) A00313 Sealant - Thread Locking, Loctite

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		APU Control Panel	49-41-51	02	5 or 15
			49-41-52	01	5, 15, 105 or 115
			49-41-52	01A	5 or 15
			49-41-52	02	9, 10 or 12
			49-41-52	02A	5
			49-41-52	03	5

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right

(2) Access Panels

- 822 Aft Cargo Door

E. Procedure

EFFECTIVITY

ALL

**49-41-81**

02

Page 403  
Dec 22/05

S 424-016

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY.  
IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE  
EQUIPMENT CAN OCCUR.

- (1) Do these steps to install the APU control panel, M1:
- (a) Loosely install the APU control panel (1) into the P5 overhead panel to make sure the front of the APU control panel is flush with the P5 overhead panel.

**NOTE:** There are two different standoffs (6) that can be installed on the APU control panel (1). The length of the first standoff (P/N 69B46200-10) is 4.25 inches. The length of the second standoff (P/N 69B46200-12) is 4.75 inches.

- (b) If the front of the APU control panel (1) is not flush with the P5 overhead panel, do these steps to replace the three standoffs (6) on the APU control panel:
  - 1) Remove the APU control panel (1) from the P5 overhead panel.
  - 2) Remove the three screws (7) from the front panel of the APU control panel (1).
    - a) Discard the three screws (7).
  - 3) Remove the three screws (4) and three washers (5) from the rear of the APU control panel (1).
  - 4) Remove the three standoffs (6) and replace them with the other three standoffs.
  - 5) Install the replacement three standoffs (6) with the three washers (5) and three screws (4).
  - 6) Apply the thread locking sealant (loctite) to the threads of the three new screws (7).
  - 7) Install the three screws (7) on the front of the APU control panel (1).

EFFECTIVITY

ALL

49-41-81

01

Page 404  
Dec 22/05

- (c) If the front of the APU control panel (1) is flush with the P5 overhead panel, put the APU control panel in position near the P5 overhead panel and connect the electrical connector D1394 (3) to the APU control panel.
  - (d) Carefully put the APU control panel (1) in the P5 overhead panel.
  - (e) Tighten the four screws (2).
- F. APU Control Panel Installation Test

S 864-010

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11A33, CB-1, IND LTS
    - 2) 11B35, APU ALTN CONT

S 864-011

- (2) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 724-017

- (3) Do the installation test for the APU control panel:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
    - 1) Make sure the FAULT light comes on and goes off.

NOTE: The FAULT light comes on when the APU fuel valve opens.

- 2) Make sure the RUN light flashes two times after you start the APU operation.

NOTE: The RUN light flashes two times when the APU control unit (ECU) completes the BITE test.

EFFECTIVITY

ALL

49-41-81

04

Page 405  
Dec 22/08

 **BOEING**  
767  
MAINTENANCE MANUAL

- 3) Make sure the RUN light comes on when the APU is at 95% rpm.
  - 4) Operate the APU for a minimum of five minutes.
- (b) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- 1) Make sure the FAULT light comes on when the APU fuel valve closes and goes off when the APU engine stops its operations.

EFFECTIVITY

ALL

**49-41-81**

01

Page 406  
Dec 22/05

APU COOLING AIR SYSTEM – DESCRIPTION AND OPERATION

1. General

A. APU Cooling Air System (Fig. 1)

- (1) APU PRE-HONEYWELL-SB 49-7391;  
The cooling air system provides forced air cooling to the APU engine compartment and engine lubricating oil for the APU. The cooling air system consists of an isolation valve for the cooling fan, cooling fan, associated ducts, and an air/oil heat exchanger (oil cooler).
- (2) APU POST-HONEYWELL-SB 49-7391;  
The cooling air system provides forced air cooling to the APU engine compartment and engine lubricating oil for the APU. The cooling air system consists of a cooling fan, associated ducts, and an air/oil heat exchanger (oil cooler).
- (3) APU PRE-HONEYWELL-SB 49-7391;  
The cooling air is drawn from the APU inlet plenum through the fan isolation valve and the fan inlet duct by the cooling fan. The fan then circulates some through the oil cooler and vents the rest to the APU engine compartment. The oil cooler air is expelled overboard through the discharge duct for the oil cooler air.
- (4) APU POST-HONEYWELL-SB 49-7391;  
The cooling air is drawn from the APU inlet plenum through the fan inlet duct by the cooling fan. The fan then circulates some through the oil cooler and vents the rest to the APU engine compartment. The oil cooler air is expelled overboard through the discharge duct for the oil cooler air.

2. Component Details

A. APU PRE-HONEYWELL-SB 49-7391;

Fan Isolation Valve (Fig. 1 and Fig. 2)

- (1) The isolation valve for the cooling fan is a butterfly valve that is pneumatically powered, spring-loaded closed, and opens when the APU is started. The valve is installed between the cooling air flange for the air inlet plenum and the cooling air fan. It consists of a shaft-mounted butterfly valve, a pneumatic actuator and an open-position indicator switch enclosed in a housing.
- (2) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE;  
The valve is pneumatically actuated when the pressure of the compressor discharge air (Pcd) rises above 7.5 psig. The position indicator switch supplies valve-open indication to the APU control unit. The pneumatic actuator consists of a cylinder, piston, piston rod, diaphragm, and spring. The actuator piston is spring-loaded to the retracted (valve closed) position.
- (3) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;  
The valve is pneumatically actuated when the pressure of the compressor discharge air (Pcd) rises above 5.0 psig. The position indicator switch supplies valve-open indication to the APU control unit. The pneumatic actuator consists of a cylinder, piston, piston rod, diaphragm, and spring. The actuator piston is spring-loaded to the retracted (valve closed) position.

B. Cooling Fan (Fig. 3)

EFFECTIVITY

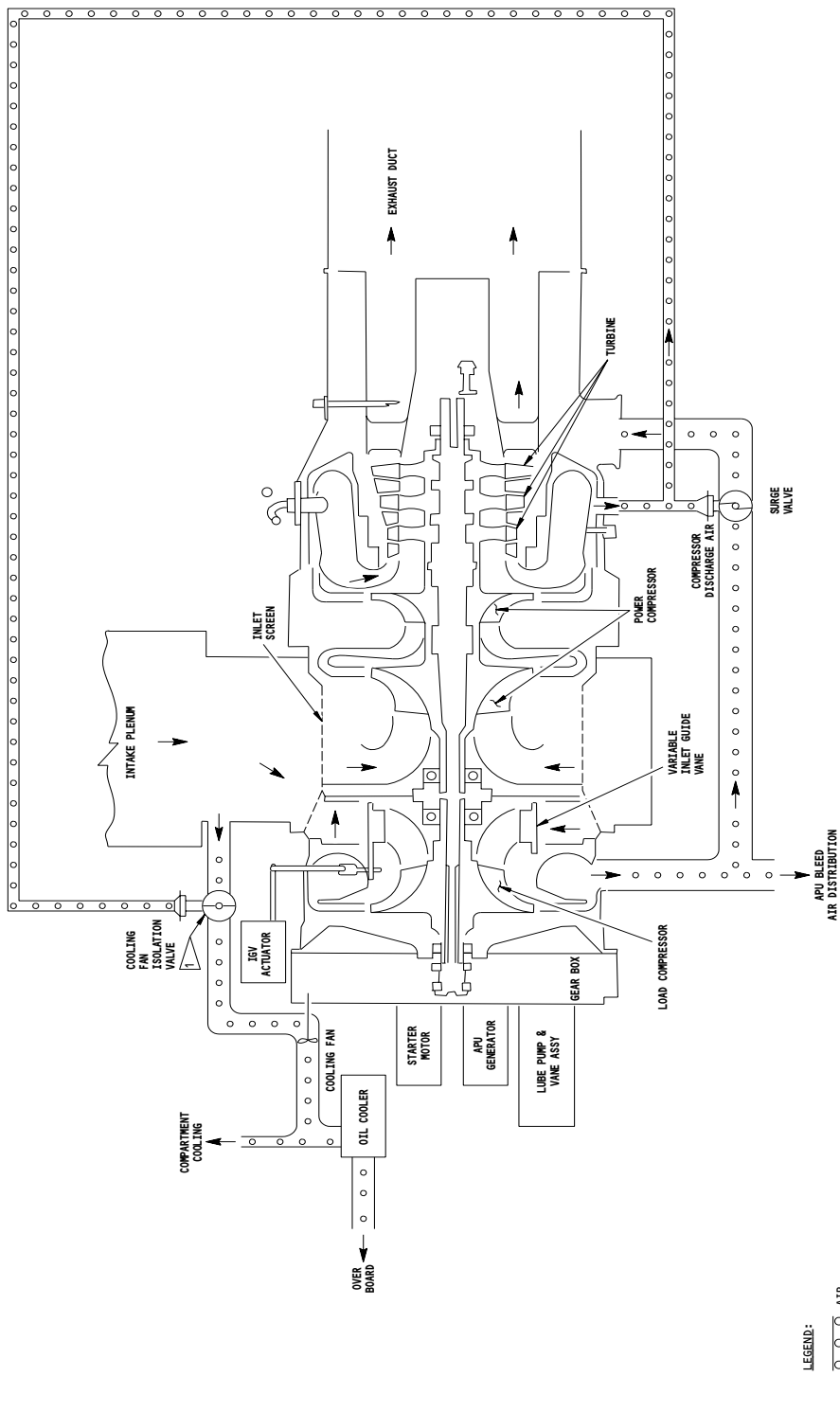
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Page 1  
Dec 22/07



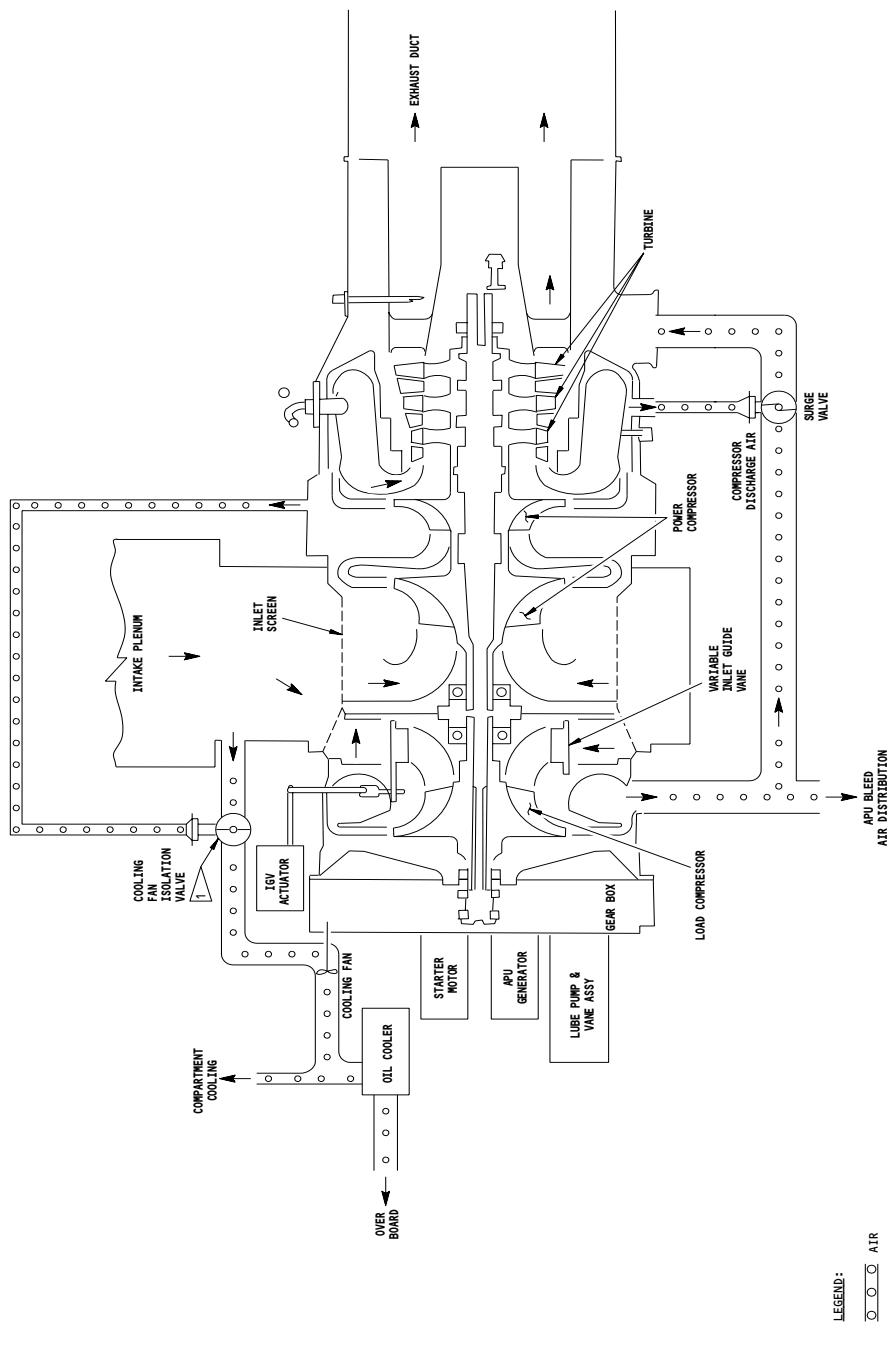


APU Cooling Air System  
Figure 1 (Sheet 1)

EFFECTIVITY  
 APU WITH THE FAN ISOLATION VALVE  
 CONNECTED TO THE SURGE VALVE

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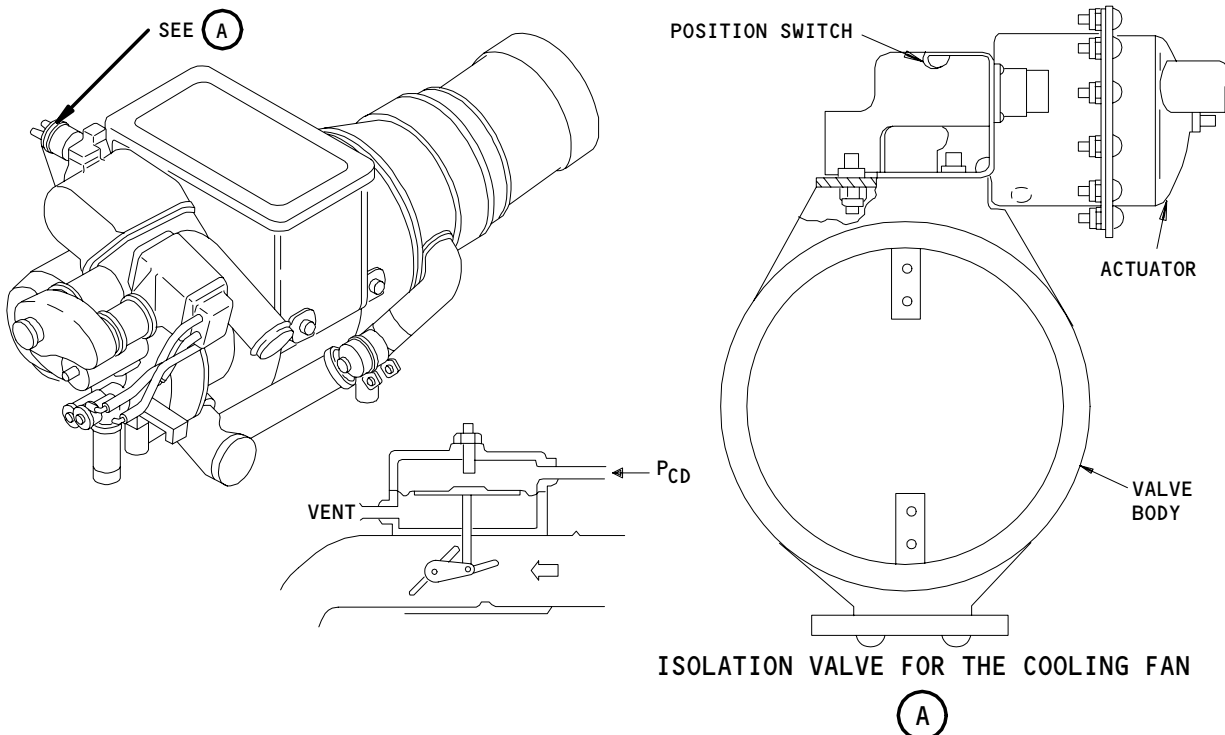
APU Cooling Air System  
Figure 1 (Sheet 2)

APUs PRE-HONEYWELL-SB 49-7391

LEGEND:  
○ ○ ○ AIR

EFFECTIVITY  
APU WITH THE FAN ISOLATION VALVE  
CONNECTED TO THE FIRST STAGE COMPRESSOR

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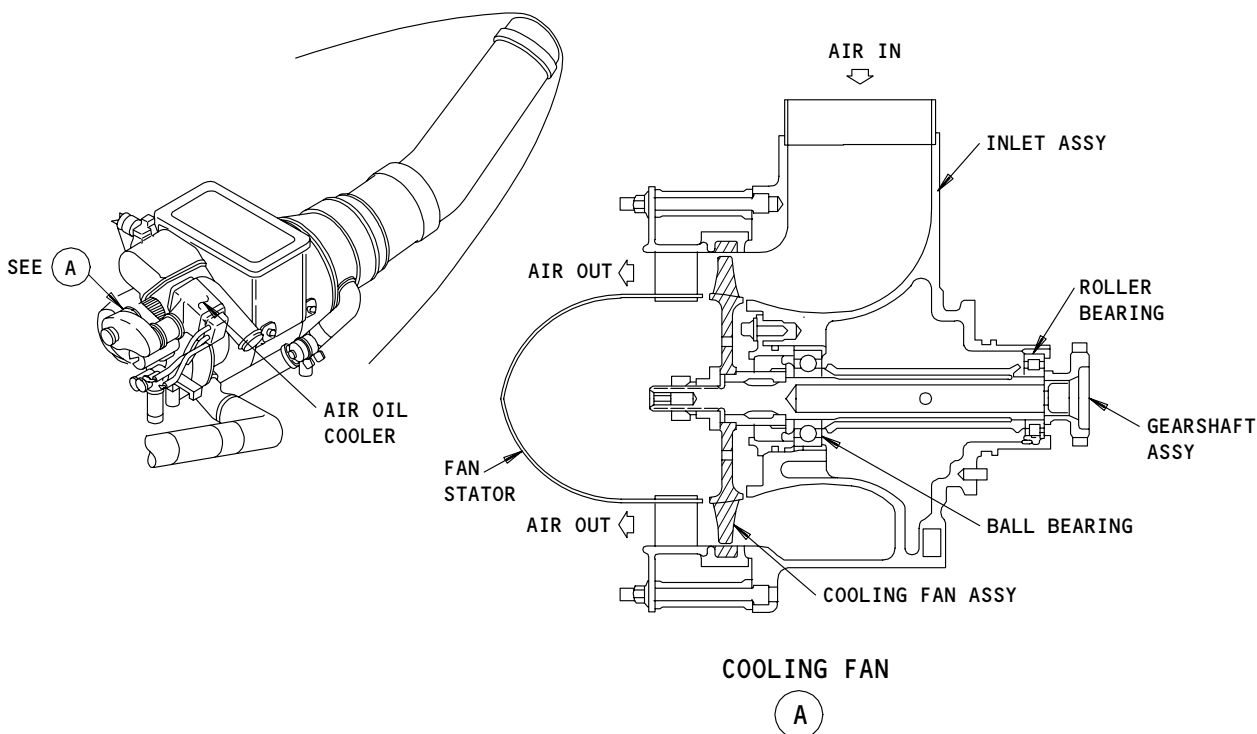


APU Cooling Fan Isolation Valve Location  
Figure 2

EFFECTIVITY  
APU PRE-HONEYWELL-SB 49-7391

49-51-00

- (1) The cooling air fan provides cooling air to the oil cooler and the APU compartment. It consists of a fan inlet housing, fan rotor and a fan stator assembly. It has a 37 blade axial rotor with 31 stator vanes. It is powered by the APU gearbox and provides 90 lb/min of cooling air. It has forward ball bearings and aft roller bearings.
- C. Cooling Air Duct for the Oil (Fig. 4)
- (1) The engine oil is cooled in an air/oil heat exchanger. The cooling air duct for the oil exhausts the oil cooler air overboard through an opening on the left side of the airplane.
- D. Compartment Cooling and Ventilation (Fig. 4)
- (1) Compartment cooling air for the APU is discharged through a port located between the cooling fan and oil cooler. To prevent overpressurization of the compartment, a louvered vent door is located on the left side of the airplane skin. The vent door blows open at 2 psid.



APU Cooling Fan Location  
Figure 3

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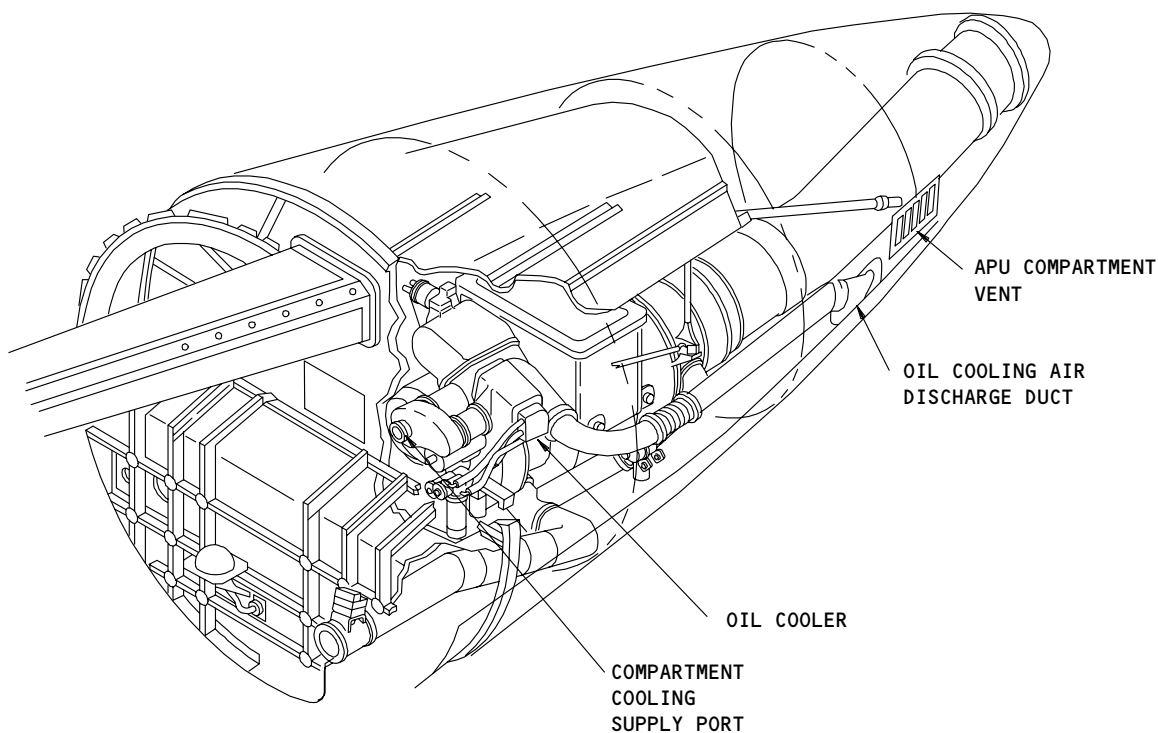
Page 5  
Aug 10/98

3. Operation

A. Functional Description

(1) Cooling Air System for the APU (Fig. 1)

- (a) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE;  
During the APU start cycle, the isolation valve for the cooling fan opens when the compressor discharge pressure in the combustion chamber rises to 7.5 psig. The valve remains open during APU operation. When the APU is shutdown, and the compressor discharge pressure drops to less than 7.5 psig, the valve returns to the closed position. If the valve does not open during the APU start cycle, a switch in the valve will cause the APU control unit to read "FAN VALVE" into BITE memory and an "APU BITE" message on EICAS maintenance page will occur. An eventual shutdown from High Oil Temperature (HOT) may occur due to the valve failure to open.



APU Compartment and Oil Cooling  
Figure 4

EFFECTIVITY	
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49-51-00

- (b) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;  
During the APU start cycle, the isolation valve for the cooling fan opens when the compressor discharge pressure in the combustion chamber rises to 5.0 psig. The valve remains open during APU operation. When the APU is shutdown, and the compressor discharge pressure drops to less than 5.0 psig, the valve returns to the closed position. If the valve does not open during the APU start cycle, a switch in the valve will cause the APU control unit to read "FAN VALVE" into BITE memory and an "APU BITE" message on EICAS maintenance page will occur. An eventual shutdown from High Oil Temperature (HOT) may occur due to the valve failure to open.
- (c) APU PRE-HONEYWELL-SB 49-7391;  
Air is supplied to the cooling fan from the air inlet plenum through the isolation valve for the cooling fan and the air inlet duct. The cooling air is compressed by the fan and discharged into the fan stator assembly. From the fan stator assembly, the air is distributed to the oil cooler and the APU compartment. The air delivered to the oil cooler removes heat from the engine lubricating oil. The exhaust air from the oil cooler is discharged overboard through the discharge duct for the cooling air. The air delivered to the engine compartment is discharged through louvered vents on the left side of the airplane.
- (d) APU POST-HONEYWELL-SB 49-7391;  
Air is supplied to the cooling fan from the air inlet plenum through the air inlet duct. The cooling air is compressed by the fan and discharged into the fan stator assembly. From the fan stator assembly, the air is distributed to the oil cooler and the APU compartment. The air delivered to the oil cooler removes heat from the engine lubricating oil. The exhaust air from the oil cooler is discharged overboard through the discharge duct for oil cooler.

B. BITE

- (1) APU PRE-HONEYWELL-SB 49-7391;  
The APU control unit finds a failure of the isolation valve for the cooling fan and writes it in BITE memory (AMM 49-61-00/001). A failure of the fan isolation valve is shown on the FAULTY LRU matrix as FAN VALVE. An automatic shutdown because of HIGH OIL TEMP is shown on the REASON APU NOT OPERATING matrix.

EFFECTIVITY

ALL

49-51-00

03

Page 7  
Aug 22/01

- (2) APU POST-HONEYWELL-SB 49-7391;  
An automatic shutdown because of HIGH OIL TEMP is shown on the  
REASON APU NOT OPERATING matrix.

EFFECTIVITY

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**49-51-00**

03

Page 8  
Aug 22/01

**BOEING**  
767  
FAULT ISOLATION/MAINT MANUAL

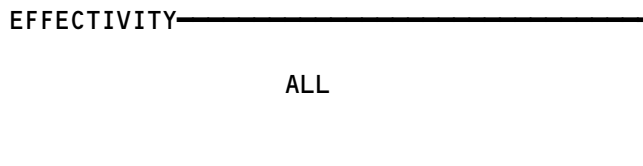
APU COOLING AIR SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
DUCT - OIL COOLING	--	1	316AR,315AL	49-51-01
FAN - COOLING	--	1	316AR,315AL	49-51-03
VALVE - FAN ISOLATION 	--	1	316AR,315AL	49-51-02
SWITCH - FAN VALVE POSITION, YBMS4 	--	1	316AR,315AL	*

\* SEE THE WDM EQUIPMENT LIST

 APUs PRE-HONEYWELL SB 49-7391

APU Cooling Air System - Component Index  
Figure 101



**49-51-00**

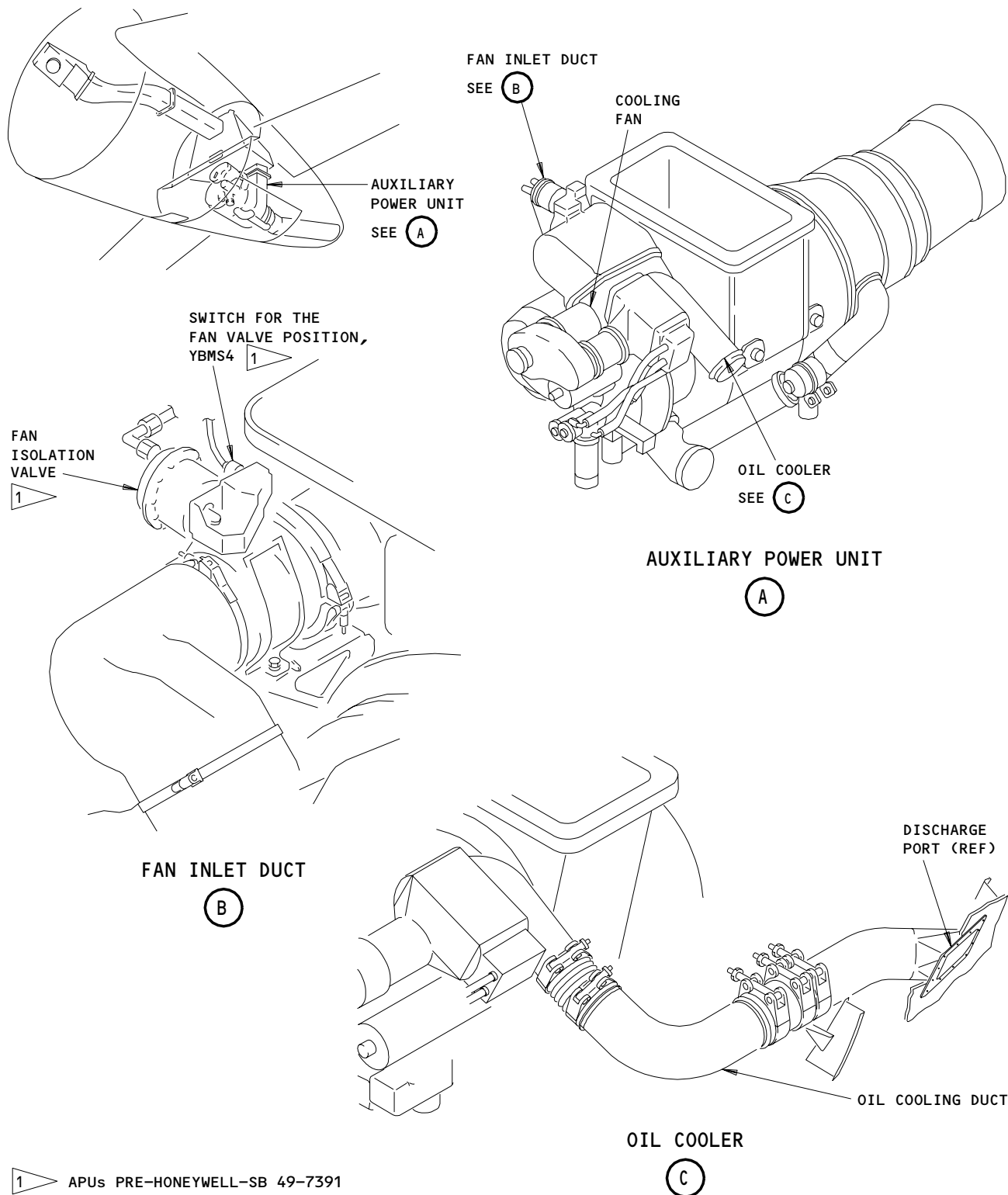
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Page 101  
Dec 22/00

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**BOEING**  
767  
FAULT ISOLATION/MAINT MANUAL



APU Cooling Air System - Component Location  
Figure 102

EFFECTIVITY	
	ALL

49-51-00

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Page 102  
Dec 22/00

OIL COOLING AIR DUCT – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the air ducts for the oil cooling.
- B. The air ducts for the oil cooling move the exhaust air from the APU oil cooler to the discharge port. The discharge port is on the left side of the fuselage.
- C. You can get access to the air ducts for the oil cooler through the APU access doors.

TASK 49-51-01-004-001

2. Oil Cooling Air Duct Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

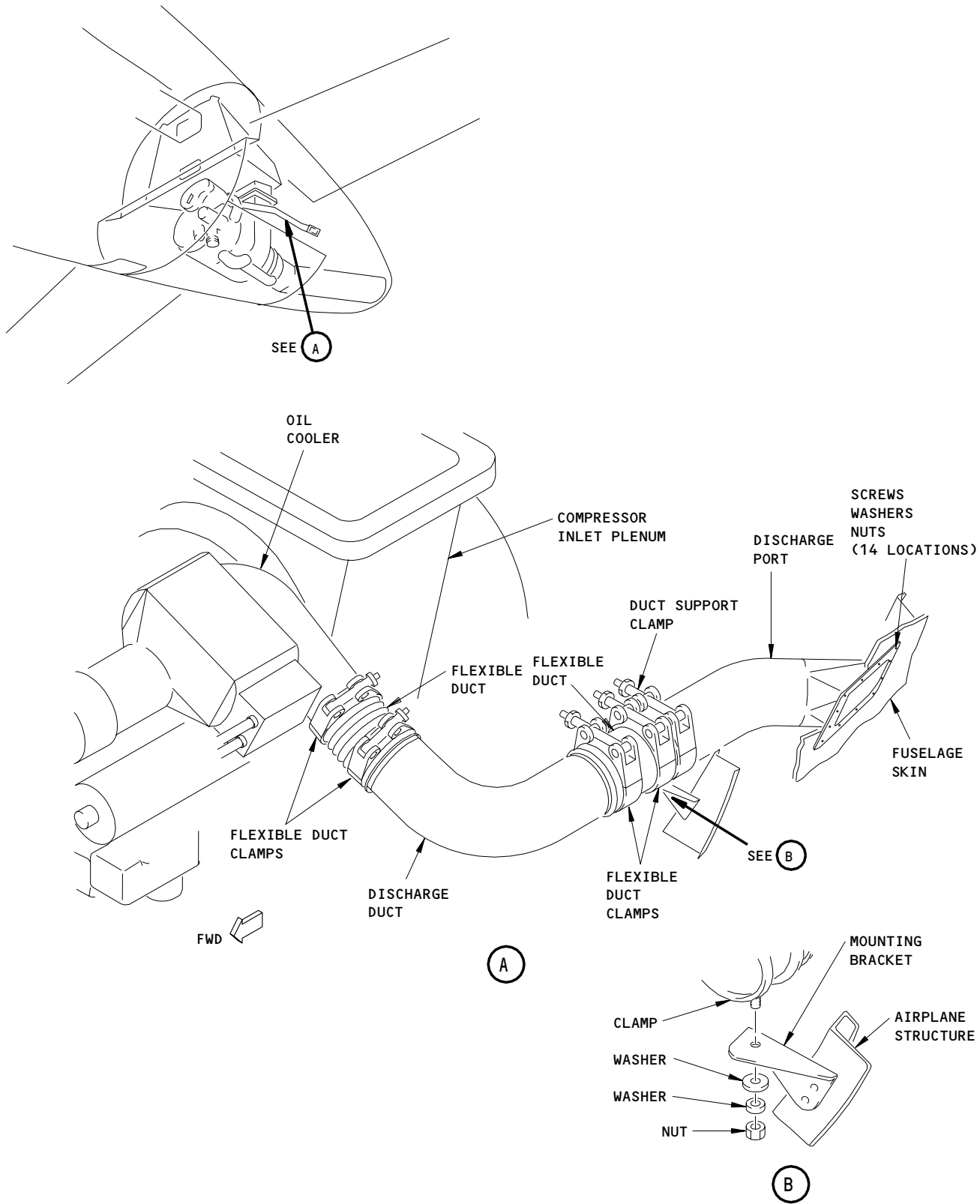
EFFECTIVITY

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49-51-01

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Page 401  
Aug 22/01



Oil Cooling Air Duct Installation  
Figure 401

EFFECTIVITY	ALL
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49-51-01

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the air ducts for the oil cooling:
  - (a) Remove the screws, the nuts, and the washers that attach the discharge port to the fuselage.
  - (b) Loosen the duct support clamp.
  - (c) Remove the clamps at the flexible duct connections.
  - (d) Move the flexible ducts until they are clear of the air ducts.
  - (e) Remove the nut and the washers that connect the support clamp to the mounting bracket.
  - (f) Remove the support clamp from the mounting bracket.

EFFECTIVITY

ALL

49-51-01

03

Page 403  
Aug 22/05

TASK 49-51-01-404-006

3. Oil Cooling Air Duct Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Discharge Port Discharge Duct	49-51-51 49-11-00	01 01	50 55 or 70

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 424-007

- (1) Install the air ducts for the oil cooling:
- (a) Install the support clamp on the mounting bracket with the nut and the washer.
  - (b) Put the discharge port in its position in the support clamp.
  - (c) Attach the discharge duct to the fuselage with the screws, the washers, and the nuts.
  - (d) Assemble the flexible ducts and the rigid ducts.
  - (e) Install the flexible duct clamps.
    - 1) Tighten the duct clamps to 10-20 inch-pounds (1.1-2.3 newton-meters).

S 414-008

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

EFFECTIVITY

ALL

**49-51-01**

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Page 404  
Aug 22/05

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 Aft Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-51-01

03

Page 405  
Aug 22/05

FAN ISOLATION VALVE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the fan isolation valve on the APU.
- B. The fan isolation valve is between the fan inlet duct and the inlet plenum on the top right side of the APU. You can get access to the fan isolation valve through the APU access doors.
- C. On some APUs, the elbow that connects the pneumatic line to the fan isolation valve has an aluminum nut. Other APUs have a stainless steel nut. Honeywell Service Bulletin No. GTC331-49-5634 installs the stainless steel nut to prevent corrosion and galling.

TASK 49-51-02-004-001

2. Fan Isolation Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

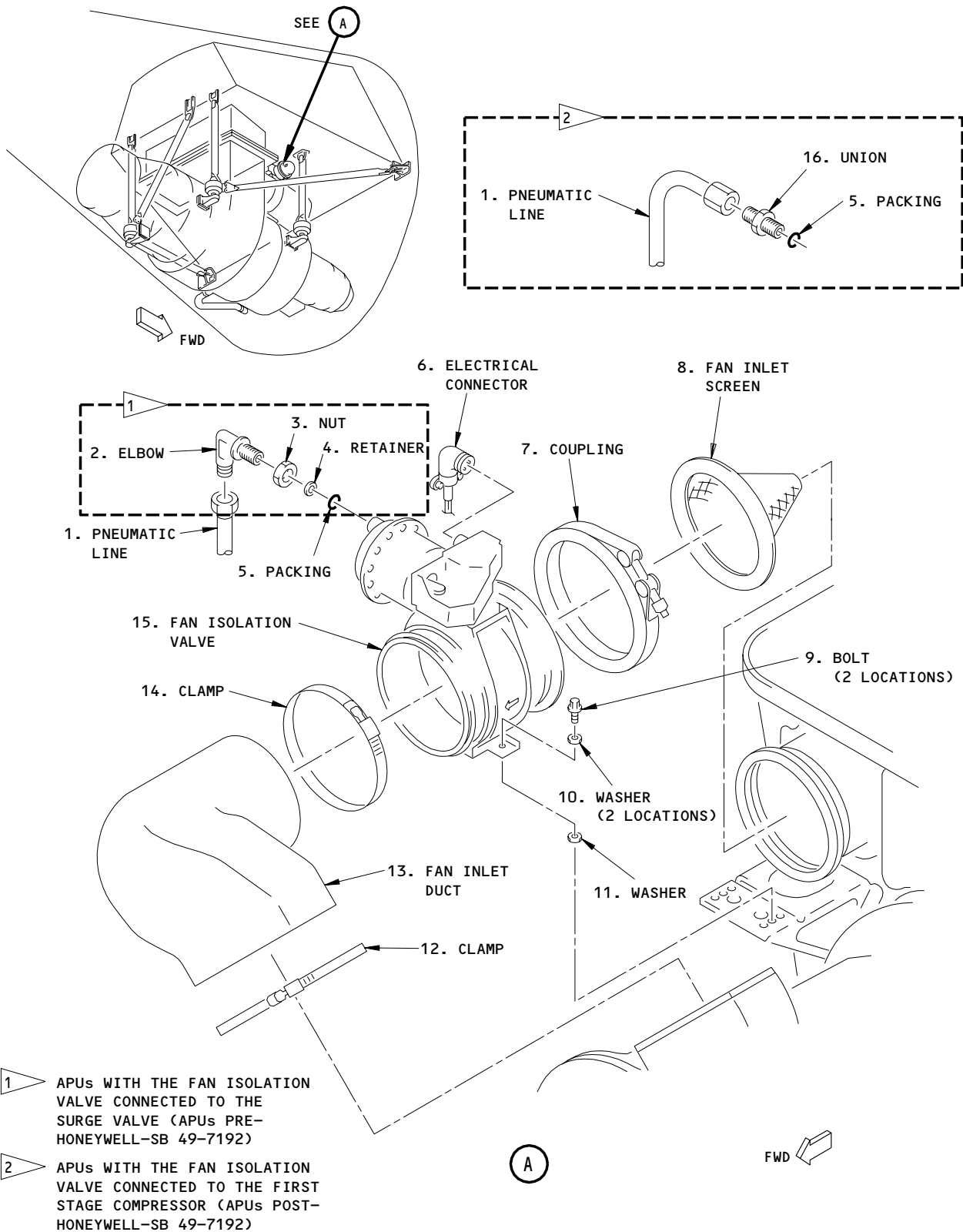
B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT



Fan Isolation Valve Installation  
Figure 401

EFFECTIVITY  
APU PRE-HONEYWELL-SB 49-7391

49-51-02



- (b) P49 APU Auxiliary Panel
  - 1) APU PRIME CONT
  - 2) APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the fan isolation valve:
  - (a) Disconnect the electrical connector (6) from the fan isolation valve (15).
  - (b) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE;  
Disconnect the pneumatic line (1):
    - 1) Disconnect the pneumatic line (1) from the elbow (2).
    - 2) Loosen the nut (3).
    - 3) Remove the elbow (2), the nut (3), the retainer (4), and the packing (5).
      - a) Discard the packing (5).
  - (c) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;  
Disconnect the pneumatic line (1):
    - 1) Disconnect the pneumatic line (1) from the union (16).
    - 2) Remove the union (16) and the packing (5) from the fan isolation valve (15).
      - a) Discard the packing (5).
  - (d) Remove the clamps (12 and 14) from the fan inlet duct (13).
  - (e) Remove the fan inlet duct (13).

EFFECTIVITY  
APU PRE-HONEYWELL-SB 49-7391

49-51-02

- (f) Remove the coupling (7) that attaches the fan isolation valve (15) to the APU inlet plenum.
- (g) Remove the bolts (9) and the washers (10) that attach the fan isolation valve (15) to the mounting bracket.
- (h) Disconnect the bonding jumper that is attached by the bolt (9).
- (i) Remove the fan isolation valve (15), the washers (11), and the inlet screen (8).

TASK 49-51-02-404-006

3. Fan Isolation Valve Installation (Fig. 401)

A. References

- (1) AMM 49-61-05/201, APU Control Unit

B. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	5 15	Packing Fan Isolation Valve	49-51-00	01	105 35

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the fan isolation valve:
  - (a) Install the inlet screen (8) and the fan isolation valve (15) on the APU inlet plenum with the coupling (7).
    - 1) Do not tighten the coupling (7) at this time.
  - (b) Install the fan inlet duct (13).
  - (c) Install the clamps (12 and 14) on the fan inlet duct (13).
    - 1) Tighten the clamps (12 and 14) to 25-30 inch-pounds (2.8-3.4 newton-meters).

EFFECTIVITY  
APU PRE-HONEYWELL-SB 49-7391

49-51-02

- (d) Measure the clearance between the fan isolation valve (15) and the mounting bracket on the APU inlet plenum.
- (e) Add the necessary washers (11) (maximum of four) to fill the space between the isolation valve (15) and the mounting bracket.
- (f) Put the bonding jumper from the HOT and the LOP sensor housing in its position on the mounting bracket.
- (g) Install the bolts (9) and the washers (10).
  - 1) Tighten the bolts (9) to 50–55 inch-pounds (5.7–6.2 newton-meters).
- (h) Tighten the coupling (7) to 45 inch-pounds (5.1 newton-meters).
- (i) Make sure the coupling (7) is correctly installed.
- (j) Tighten the coupling (7) again if it is necessary.
- (k) Connect the electrical connector (6) to the fan isolation valve (15).
- (l) Install a lockwire on the electrical connector (6).
- (m) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE VALVE;  
Connect the pneumatic line (1):
  - 1) Lubricate the new packing (5) with a light coat of lubricant.
  - 2) Install the packing (5), the retainer (4), and the nut (3) on the elbow (2).
  - 3) Install the elbow in the fan isolation valve (15).
  - 4) Connect the pneumatic line (1) to the elbow (2).
  - 5) Tighten the nut (3) on the elbow (2).
    - a) If the nut (3) is aluminum, tighten the nut to 40–60 inch-pounds (4.5–6.8 newton-meters).
    - b) If the nut (3) is stainless steel, tighten the nut to 100–120 inch-pounds (11.3–13.6 newton-meters).
- (n) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR;  
Connect the pneumatic line (1):
  - 1) Lubricate the new packing (5) with a light coat of lubricant.
  - 2) Install the packing (5) on the union (16).
  - 3) Install the union (16) in the fan isolation valve (15).
  - 4) Connect the pneumatic line (1) to the union (16).

S 214-014

- (2) If there was a heat problem, examine the fan inlet duct for damage.

S 734-008

- (3) Do this task: APU Control Unit – Self Test (AMM 49-61-05/201).

S 414-009

- (4) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 864-010

- (5) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) APU PRIME CONT

2) APU START

(b) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 864-011

- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

COOLING FAN - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the cooling air fan for the APU.
- B. The cooling air fan is on the APU gearbox above the generator.
- C. On some APU's, the cooling fan has an air pressure tube installed between the fan and the compressor case. This pressure tube is installed to help decrease the cooling fan faults. Garrett SB GTCP331-49-5841 installs the new cooling fan and the air pressure tube on the APU.
- D. You can get access to the cooling air fan through the APU access doors.

TASK 49-51-03-004-001

2. Cooling Fan Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

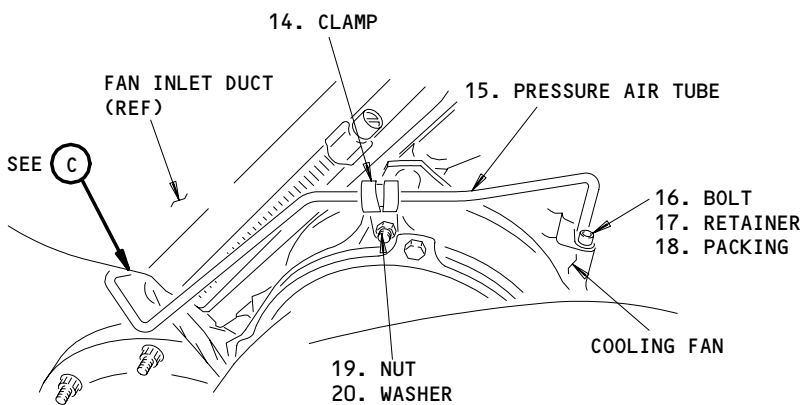
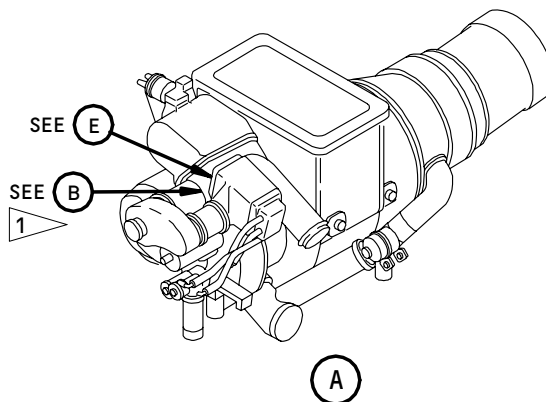
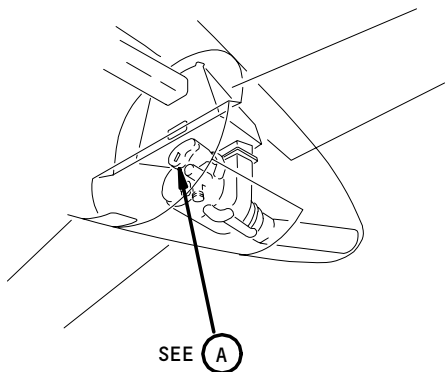
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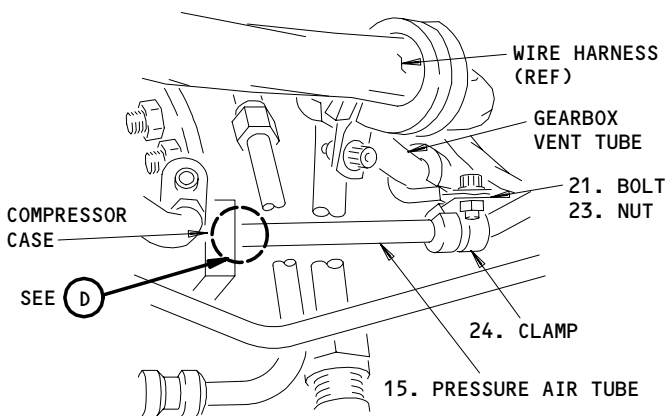
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Page 401  
Aug 22/01



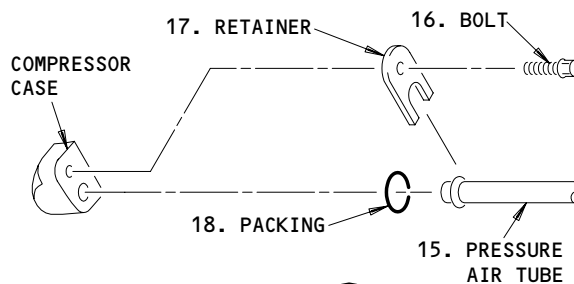
**INSTALLATION OF THE PRESSURE AIR TUBE**



**INSTALLATION OF THE PRESSURE AIR TUBE**



1 NOT INSTALLED ON ALL APU'S



**Cooling Fan Installation  
Figure 401 (Sheet 1)**

EFFECTIVITY

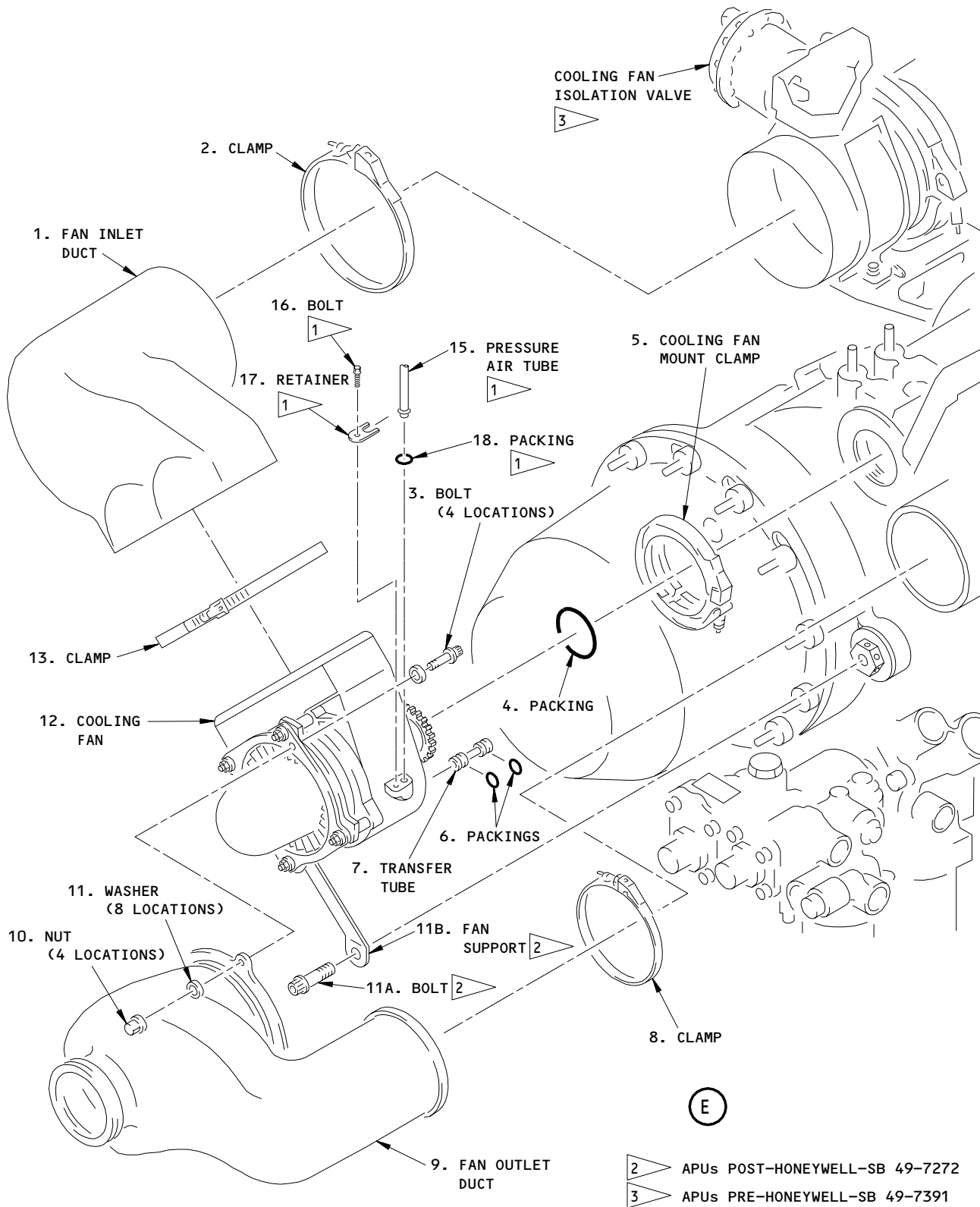
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**49-51-03**

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Page 402  
Nov 10/95

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Cooling Fan Installation  
Figure 401 (Sheet 2)

EFFECTIVITY

ALL

49-51-03

01

Page 403  
Apr 22/03

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-016

- (4) APU WITH THE AIR PRESSURE TUBE FOR THE COOLING FAN;

Remove the air pressure tube (15):

- (a) Remove the bolt (16) and the retainer (17) that attach the air pressure tube (15) to the cooling fan.
- (b) Remove the nut (19), the washer (20), and the pressure tube clamp (14) from the cooling fan stud.
- (c) Install the washer (20) and the nut (19) on the cooling fan stud.
  - 1) Tighten the nut (19) to 75 inch-pounds (8.5 N.m).
- (d) Remove the bolt (21) and the nut (23) that attach the clamp (24) to the clamp on the gearbox vent tube.
- (e) Remove the bolt (16) and the retainer (17) that attach the air pressure tube (15) to the compressor case.
- (f) Remove the air pressure tube (15).
- (g) Remove the packings (18) from the ends of the air pressure tube (15).
  - 1) Discard the packings (18).

EFFECTIVITY

ALL

49-51-03

04

Page 404  
Aug 22/01



S 024-007

- (5) Remove the APU cooling fan:
- (a) Remove the clamp (8) from the fan outlet duct (9).
  - (b) Remove the nuts (10), washers (11), and the bolts (3) that attach the fan outlet duct (9) to the cooling fan (12).
  - (c) Remove the fan outlet duct (9).
  - (d) Remove the clamps (2 and 13) from the fan inlet duct (1).
  - (e) Remove the fan inlet duct (1).
  - (f) APU POST-HONEYWELL-SB 49-7272;  
Remove the bolt (11A) that attaches the cooling fan support (11B) to the gearbox plug.
  - (g) Remove the clamp (5) that attaches the cooling fan (12) to the gearbox.
  - (h) Remove the cooling fan (12) and the packing (4).  
1) Discard the packing (4).
  - (i) Remove the transfer tube (7) from the cooling fan (12).  
1) Discard the packings (6).

TASK 49-51-03-404-008

3. Cooling Fan Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	4	Packing	49-51-00	01	60
	6	Packing			55
	12	Cooling Fan			45 or 46
	18	Packing			44 or 44B

EFFECTIVITY

ALL

**49-51-03**

01

Page 405  
Aug 22/05

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-014

(1) Install the cooling fan:

- (a) Lubricate the new packings (6) with a light coat of lubricant or oil.
- (b) Install the packings (6) on the transfer tube (7).
- (c) Install the transfer tube (7) in the cooling fan (12).
- (d) Lubricate the new packing (4) with a light coat of lubricant or oil.
- (e) Install the packing (4) on the cooling fan (12).

**CAUTION:** MAKE SURE YOU ALIGN THE GEARBOX GEARS AND THE COOLING FAN GEAR BEFORE YOU INSTALL THE FAN. DAMAGE TO THE COOLING FAN CAN OCCUR IF YOU DO NOT ALIGN THE GEARS.

- (f) Install the cooling fan (12) on the APU gearbox.
- (g) Install the clamp (5):
  - 1) Install the clamp (5) that attaches the cooling fan (12) to the gearbox.
  - 2) APU POST-ALLIEDSIGNAL-SB 49-7272;  
Do the steps that follow:
    - a) Install the bolt (11A) that attaches the cooling fan support (11B) to the gearbox plug.
    - b) Tighten the bolt (11A) to 130 inch-pounds (14.7 newton-meters).
    - c) Tighten the nut that attaches the cooling fan support (11B) to the cooling fan (12) to 125 inch-pounds (14.1 newton-meters).
  - 3) Adjust the clamp (5) until the flexible duct makes an overlap on the clamp by a minimum of 0.06 inch (1.5 mm).

EFFECTIVITY

ALL

49-51-03

01

Page 406  
Apr 22/04

- 4) Tighten the clamp (5) to 50 inch-pounds (5.7 newton-meters).
- (h) Install the fan inlet duct (1).
- (i) Install the clamps (2 and 13) on the fan inlet duct (1).
  - 1) Tighten the clamps (2 and 13) to 25 inch-pounds (2.8 newton-meters).
- (j) Install the fan outlet duct (9).
- (k) Install the bolts (3), washers (11), and the nuts (10).
  - 1) Tighten the nuts (10) to 40-50 inch-pounds (4.5-5.7 newton-meters).
- (l) Install the clamp (8) on the fan outlet duct (9).
  - 1) Tighten the clamp (8) to 25 inch-pounds (2.8 newton-meters).

S 424-018

- (2) APU WITH THE AIR PRESSURE TUBE FOR THE COOLING FAN;  
Install the air pressure tube (15):
  - (a) Lubricate the new packings (18) with a light coat of lubricant or oil.
  - (b) Install the packings (18) on the ends of the air pressure tube (15).
  - (c) Put the air pressure tube (15) in its position between the cooling fan (12) and the APU compressor case.
  - (d) Install the retainer (17) and the bolt (16) that attach the air pressure tube (15) to the compressor case.
  - (e) Attach the clamp (24) to the clamp on the gearbox vent tube with the bolt (21) and the nut (23).
  - (f) Remove the nut (19) and the washer (20) from the cooling fan stud.
  - (g) Install the clamp (24), the washer (20), and the nut (19) on the cooling fan stud.
    - 1) Tighten the nut (19) to 75 inch-pounds (8.5 newton-meters).
  - (h) Install the retainer (17) and the bolt (16) that attach the air pressure tube (15) to the cooling fan (12).

S 414-010

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

EFFECTIVITY

ALL

49-51-03

01

Page 407  
Aug 22/01

 **BOEING**  
767  
MAINTENANCE MANUAL

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-011

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-012

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-51-03

03

Page 408  
Aug 22/01

COOLING FAN - INSPECTION/CHECK

1. General

- A. This procedure contains a task to do an inspection of the drive gear for the APU cooling fan. This task is done in the APU compartment.

TASK 49-51-03-216-020

2. Cooling Fan Drive Gear Inspection

A. References

- (1) AMM 49-51-03/401, Cooling Fan

B. Access

(1) Location Zones

- |     |                         |
|-----|-------------------------|
| 315 | APU Compartment - Left  |
| 316 | APU Compartment - Right |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |

C. Procedure

S 026-022

- (1) Do this task: Cooling Fan Removal (AMM 49-51-03/401).

S 216-023

- (2) Visually examine the fan drive gear and idler gear teeth. Examine at least six adjacent teeth.

NOTE: You cannot get sufficient access to the idler gear (inside the gearbox) to examine the gear teeth on-wing. If you see wear on the drive gear (on the fan shaft), then the idler gear has the same quantity of wear. This inspection procedure is accurate only if the two gears have operated together since new or for so long that they have the same quantity of wear.

- (a) The overall surface of the gear should be even and continuous.  
(b) Any frosting or uneven wear is unsatisfactory.  
(c) You should be able to see the lateral grind marks from the original manufacture on the tooth face. The grind marks should be continuous on the tooth face. It can help to compare to a new gear.

EFFECTIVITY

ALL

49-51-03

01

Page 601  
Aug 22/01

S 216-024

- (3) Any unsatisfactory wear means that the two gears could fail. If you find unsatisfactory wear, it is recommended that you replace the APU (AMM 49-11-01/401) and the cooling fan (AMM 49-51-03/401).

NOTE: You must remove the APU to replace the idler gear.

S 426-025

- (4) If the gear teeth are satisfactory, do this task: Cooling Fan Installation (AMM 49-51-03/401).

EFFECTIVITY

ALL

**49-51-03**

01

Page 602  
Apr 22/99

APU BLEED AIR SYSTEM – DESCRIPTION AND OPERATION

1. General

A. Bleed Air System for the APU (Fig. 1)

- (1) The bleed air system for the APU provides compressed air for airplane air conditioning, main engine starting, and air-driven hydraulic pumps. The system consists of inlet guide vanes and the actuator for the inlet guide vanes.
- (2) When the APU engine reaches 95% speed, bleed air can be taken from the APU. The amount of bleed air is electronically controlled by the APU control unit. The control unit receives airplane pneumatic demands and sends a signal to the torque motor for the inlet guide vanes to position the guide vanes accordingly. The guide vane position controls the airflow through the load compressor.

2. Component Details

A. Inlet Guide Vanes (IGV) (Fig. 2)

- (1) The assembly for the inlet guide vanes consists of 28 guide vanes that are radially connected and located at the load compressor inlet. The vanes pivot about their leading edge and are supported at each end by sleeve bearings. Each vane has an individual sector gear on its front end which is meshed with a ring gear. The vane trailing edge swings to the open or closed position.

B. Actuator for the Inlet Guide Vanes (Fig. 3)

- (1) The actuator for the inlet guide vanes positions the inlet guide vanes in response to signals from the APU control unit. The power source of the actuator is regulated fuel pressure from the fuel control unit. The actuator consists of a torque-motor driven servo, a second-stage servo spool, a hydraulic actuator piston, and a linear-variable differential transformer. The actuator is mounted to the left side of the load compressor case.

3. Operation

A. Functional Description

(1) APU Control Unit (Fig. 1)

- (a) The APU control unit electronically controls the inlet guide vanes by sending signals to the IGV torque motor. The control unit receives pneumatic demands from the airplane and sets the guide vanes accordingly. The aircraft pneumatic demand signals are: main engine start (28 vdc signal), bleed air (28 vdc signal), air driven pump (28 vdc signal), ECS enable (28 vdc signal), ECS demand (1-9 volt signal), and air/ground (ground signal indicates ground operation).

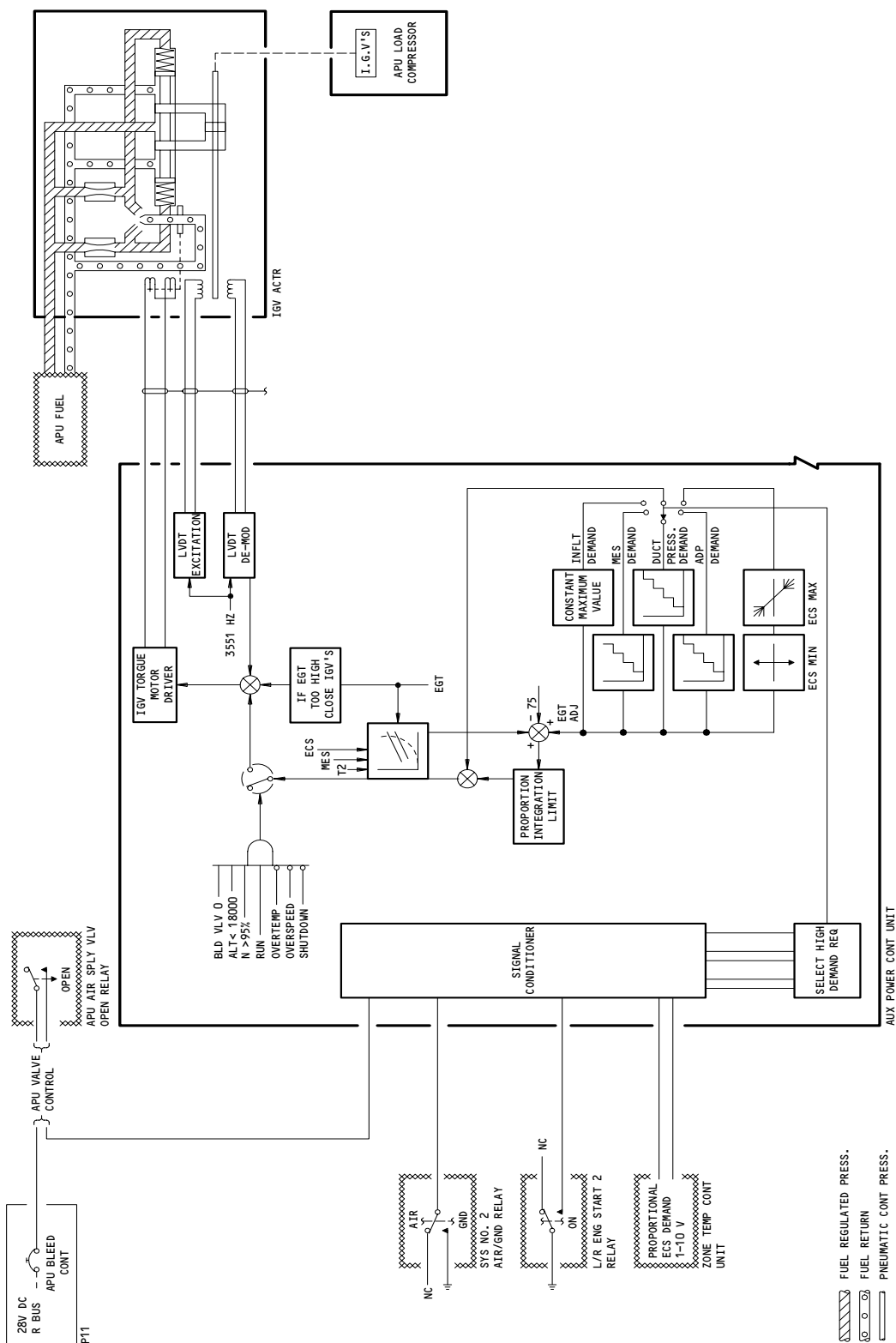
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Page 1  
Dec 22/01



APU Bleed Air System  
Figure 1

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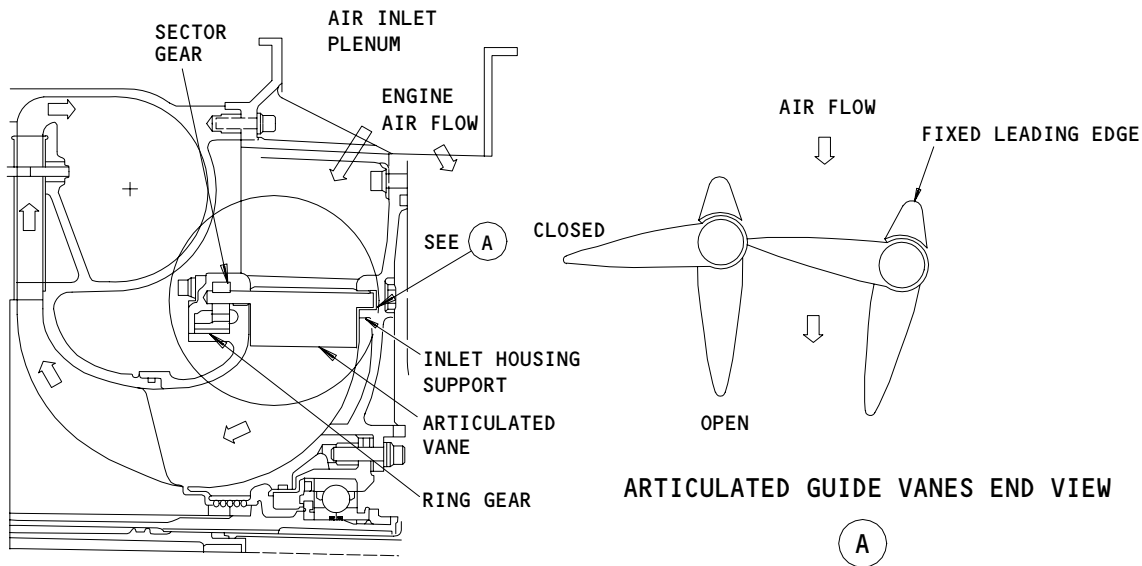
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Page 2  
Dec 22/01



- (b) During the APU start sequence, the IGVs are held shut to minimize shaft loading. When 95% speed is reached, the APU control unit allows electric and pneumatic loading. If the loads cause the APU to exceed temperature limits, the control unit will reduce the pneumatic load and give priority to the electric load.
- (2) Actuator for the Inlet Guide Vanes (IGVA) (Fig. 3)
- (a) The actuator for the inlet guide vanes is powered by high pressure fuel from the fuel control unit. It is controlled by the APU electronic control unit which generates a 0-140 ma analog position control signal. This signal energizes the torque motor to produce a pressure imbalance on the second-stage servo spool. Spool movement allows high pressure fuel to flow to the main actuator piston. The piston drives the ring gear and has a one inch stroke. A linear-variable differential transformer measures the position of the piston and sends a signal to the APU control unit. The control unit compares this feedback position to the command position and signals the actuator accordingly.
- (3) IGV Control (Fig. 4 and 5)

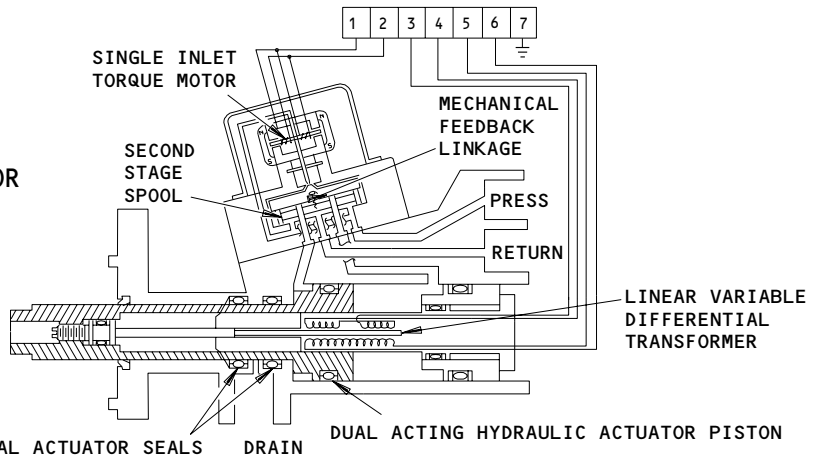
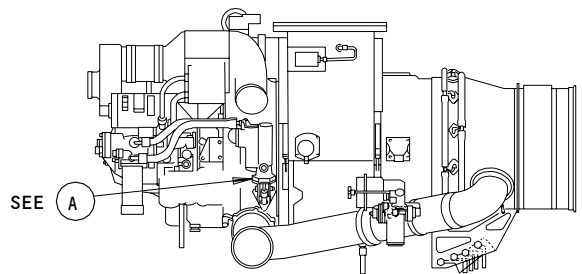
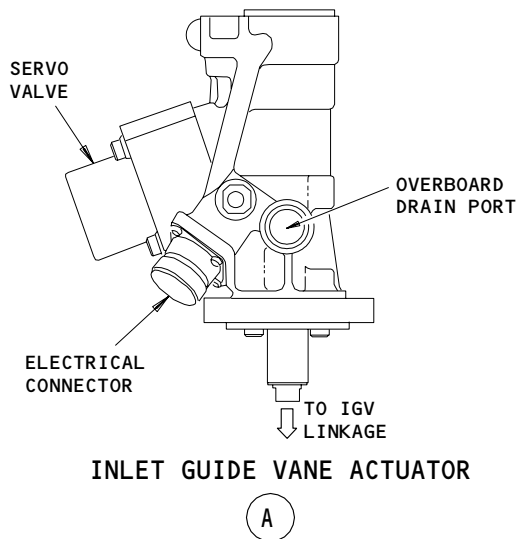


LOAD COMPRESSOR CROSS SECTION

APU Inlet Guide Vanes  
Figure 2

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**APU Inlet Guide Vane Actuator**  
Figure 3

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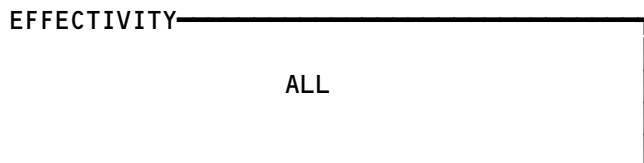
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- (a) The APU control unit performs the IGV control logic. It determines in which pneumatic mode the APU will operate based on the pneumatic demand signals received. There are six distinct pneumatic modes of operation: Idle, Duct Pressurization, Environmental Control System (ECS), Main Engine Start (MES), Air Driven Pump (ADP), and Inflight.
- (b) IGV logic selects the highest demand mode if more than one is requested. The ECS pneumatic demand is a variable signal between 1-9 volts. The APU control unit controls the guide vanes according to the demand input of the variable ECS. The minimum and maximum limits are below 1 volt and above 9 volts respectively.
- (c) IGV Position Control Limited by EGT
  - 1) The APU control unit gives priority to the electrical shaft load in all operating modes. If exhaust gas temperature exceeds the temperature limit schedule, the control unit modulates the IGVs closed to reduce the pneumatic load.
- (d) Adjustable Position Switches for the IGV
  - 1) The IGV setpoint angle for selected pneumatic modes can be adjusted by switches located under a coverplate on the face of the APU control unit. The effect of switch settings (A through E) on IGV angle positioning by the APU control unit is shown in Fig. 4 and 5. Switch adjustment is not for line maintenance.

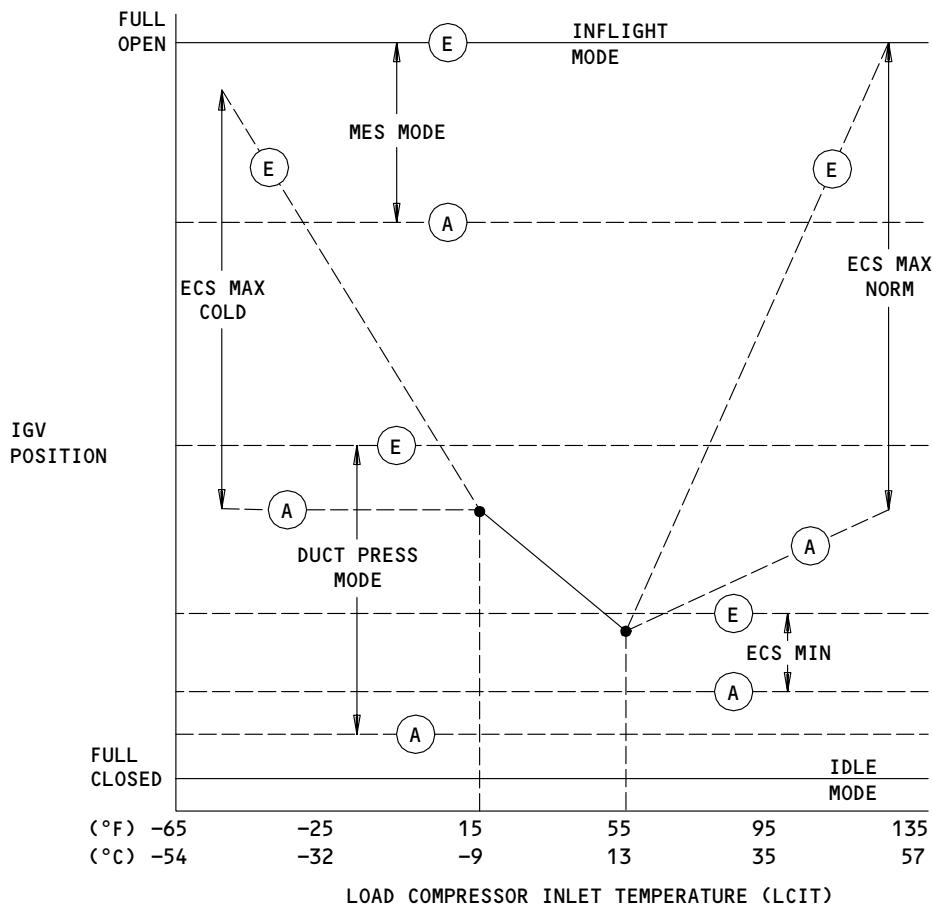
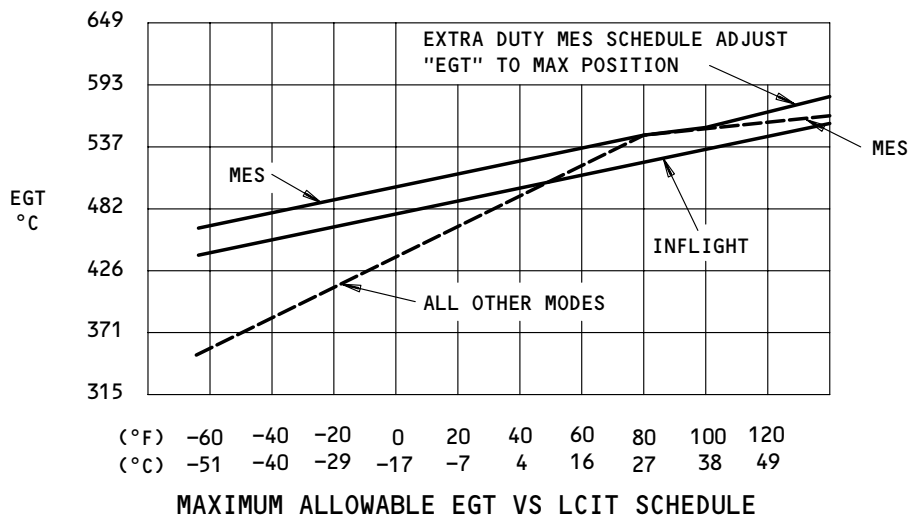
PNEUMATIC DEMAND SIGNALS					IGV POSITION (DEGREES)	PNEUMATIC MODE
AIR/GROUND	APU BLEED AIR VALVE	ECS PACK	MES	ADP		
—	CLOSED	—	—	—	(CLOSED)	IDLE
GROUND	OPEN	OFF	OFF	OFF	79° TO 27°	DUCT PRESSURE
GROUND	OPEN	ON	OFF	—	74° TO -20°	ECS
GROUND	OPEN	—	ON	—	-20° (FULL OPEN)	MES
GROUND	OPEN	OFF	OFF	ON	3°	ADP
AIR	OPEN	—	—	—	-20° (FULL OPEN)	INFLT

**NOTE:** HIGH EGT CAUSES THE IGV TO MODULATE CLOSED IN ALL PNEUMATIC MODES.

APU IGV Control Logic  
Figure 4



49-52-00



**IGV POSITION SCHEDULE**  
APU IGV Position Control  
Figure 5

EFFECTIVITY ——— ALL

**49-52-00**

B. BITE

- (1) The APU control unit monitors the performance of the actuator for the inlet guide vanes and writes a fault in the BITE memory (AMM 49-61-00/001). A failure of the torque motor for the actuator of the inlet guide vanes is shown in the FAULTY LRU matrix as IGV ACT. An automatic shutdown because of START ABORTED is shown on the REASON APU NOT OPERATING matrix.

EFFECTIVITY

ALL

49-52-00

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Page 7  
Feb 10/95

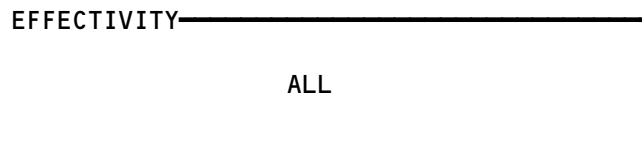
**BOEING**  
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FAULT ISOLATION/MAINT MANUAL

APU BLEED AIR SYSTEM

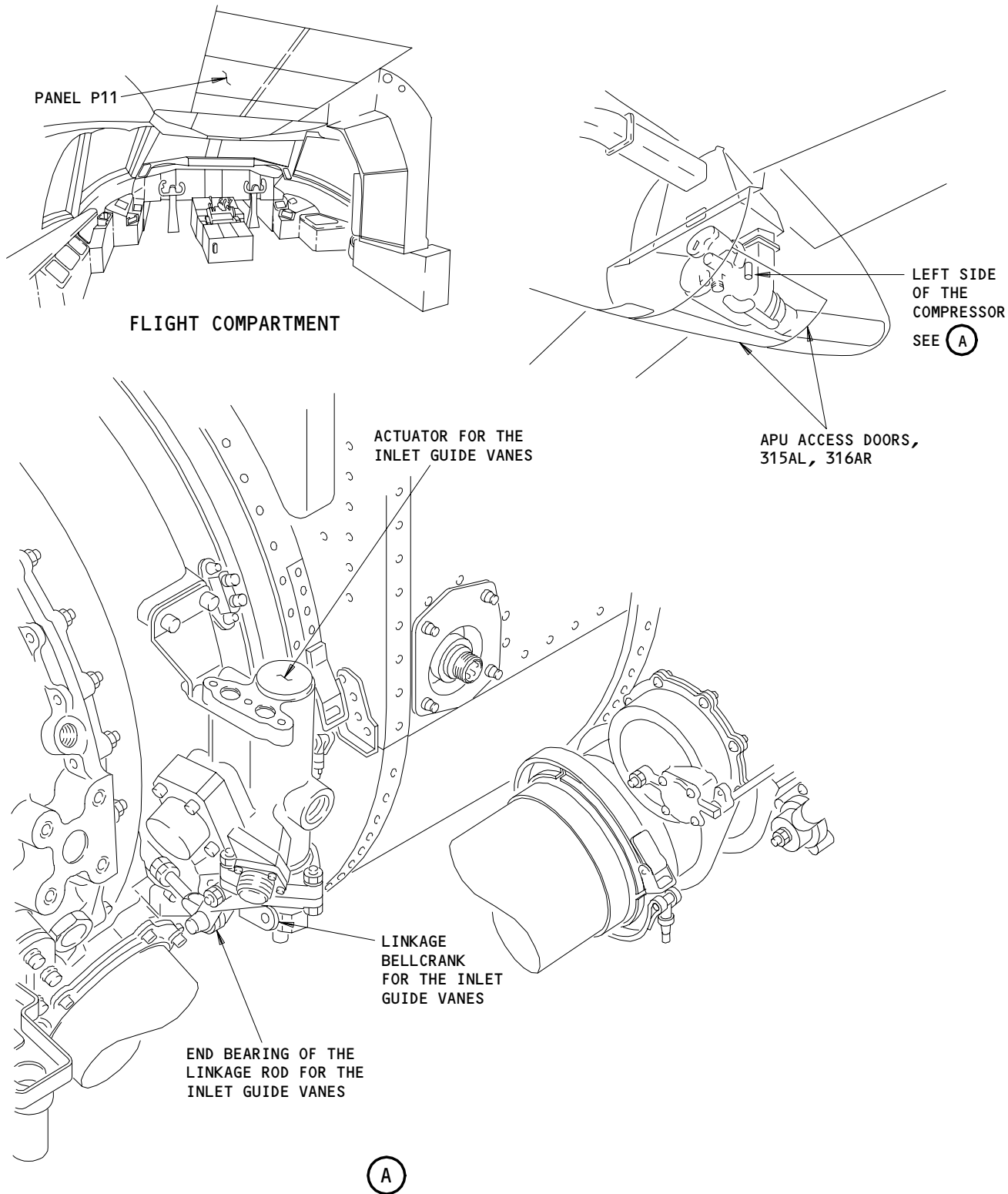
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ACTUATOR - INLET GUIDE VANE, YBMM6	--	1	316AR,315AL, APU COMP, LEFT SIDE COMPRESSOR	49-52-02
BEARING - INLET GUIDE VANE LINKAGE ROD END	--	1	316AR,315AL, APU COMP, LEFT SIDE COMPRESSOR	49-52-01
BELLCRANK - INLET GUIDE VANE LINKAGE	--	1	316AR,315AL, APU COMP, LEFT SIDE COMPRESSOR	49-52-03
CARD ASSYS - (73-21-00/101) L ENG EEC DISCRETES, M590 R ENG EEC DISCRETES, M591				
CIRCUIT BREAKER - AIR SUPPLY APU BLEED CONT, C1333	--	1	11S24	*
RELAYS - (31-01-06/101) L ENG START 2, K10247 R ENG START 2, K10250				
RELAY - (31-01-37/101) SYSTEM NO. 2 AIR/GRD, K214				
RELAY - (31-01-49/101) APU AIR SUPPLY VALVE OPEN IND, K25				
SWITCH - (49-51-00/102) FAN VALVE POSITION, YBMS4				
TRANSDUCERS - (49-53-00/101) DIFFERENTIAL PRESSURE, YBMTS3 TOTAL PRESSURE, YBMTS2				
UNIT - (21-61-00/101) ZONE TEMPERATURE CONT, M195				
VALVE - SURGE, YBMM5 (49-53-00/101)				

\* SEE THE WDM EQUIPMENT LIST

APU Bleed Air System - Component Index  
Figure 101



**49-52-00**



APU Bleed Air System - Component Location  
Figure 102

EFFECTIVITY

ALL

49-52-00

01

Page 102  
Feb 10/92

INLET GUIDE VANE LINKAGE ROD END BEARING – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the bearing on the end of the linkage rod for the inlet guide vane (IGV).
- B. The rod bearing connects the IGV bellcrank to the IGV connector rod. The IGV bellcrank is on the IGV actuator. The IGV actuator is on the lower left side of the APU, forward of the inlet plenum.
- C. You can get access to the IGV actuator and the linkage rod bearing through the APU access doors.

TASK 49-52-01-004-001

2. IGV Linkage Rod Bearing Removal (Fig. 401)

- A. Standard Tools and Equipment
  - (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel
- B. References
  - (1) AMM 49-52-02/401, Inlet Guide Vane Actuator
- C. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right
    - 211 Flight Compartment – Left
    - 212 Flight Compartment – Right
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right
    - 822 Aft Cargo Door
- D. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35 APU ALTN CONT

EFFECTIVITY

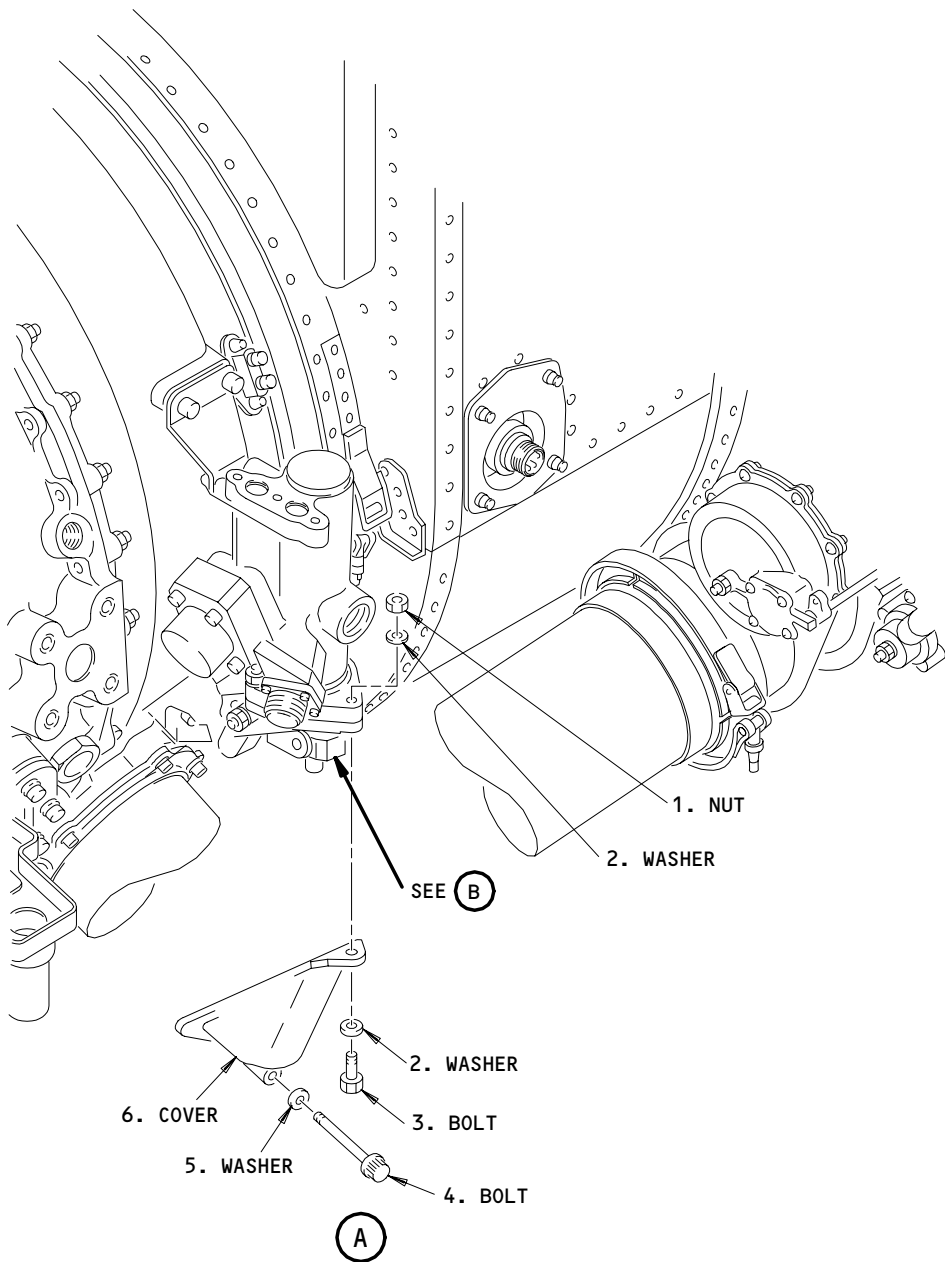
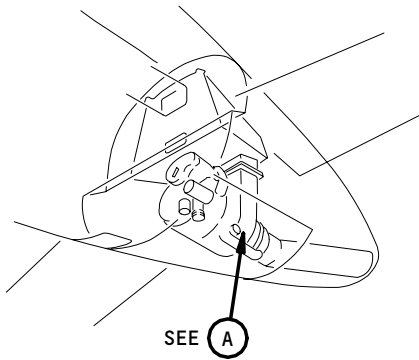
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Page 401  
Aug 22/01





IGV Linkage Rod End Bearing Installation  
Figure 401 (Sheet 1)

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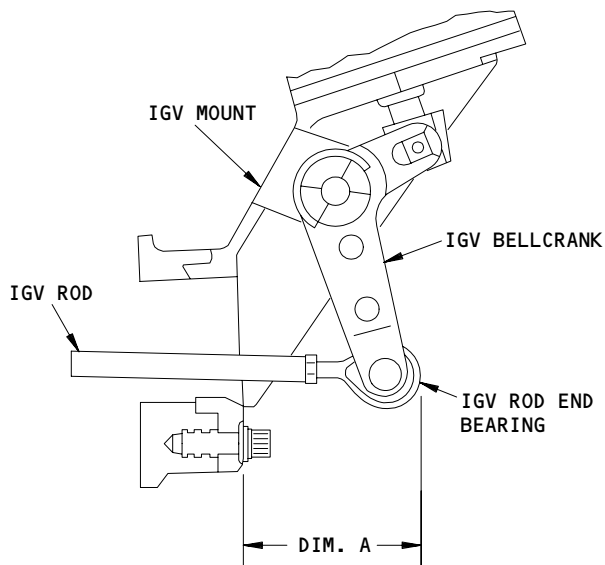
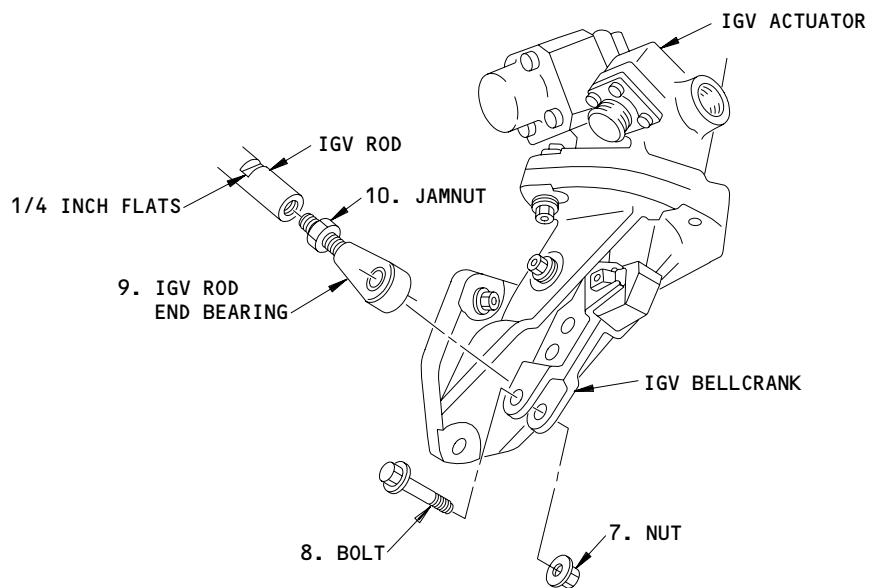
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49-52-01

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Page 402  
Feb 10/95

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(B)

IGV Linkage Rod End Bearing Installation  
Figure 401 (Sheet 2)

EFFECTIVITY

ALL

49-52-01

01

Page 403  
Feb 10/95

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- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the linkage rod bearing for the IGV:

- (a) Remove the bolts (3 and 4), the washers (2 and 5), and the nut (1) that attach the cover (6) to the APU.
- (b) Remove the Inlet Guide Vane (IGV) actuator (AMM 49-52-02/401).
- (c) With the bellcrank connected, pull the rod end to open the inlet guide vanes.
- (d) Move the IGV bellcrank linkage as far as possible.
- (e) Measure dimension A from the IGV mount to the end of the rod end to use during the adjustment.
- (f) Remove the nut (7) and the bolt (8) that attach the linkage rod bearing and the connector rod to the IGV bellcrank.
- (g) Use a wrench on the flat areas of the connector rod to hold the rod tightly in its position.
- (h) Loosen the jamnut (10) while you hold the connector rod with the wrench.

NOTE: The connector rod must not turn while you loosen the jamnut.

- (i) Remove the linkage rod bearing (9) from the IGV connector rod.

EFFECTIVITY

ALL

49-52-01

03

Page 404  
Aug 22/01

(j) Remove the jamnut (10) from the linkage rod bearing (9).

TASK 49-52-01-404-006

3. IGV Linkage Rod Bearing Installation (Fig. 401)

A. References

- (1) AMM 49-52-01/501, Inlet Guide Vane Linkage Rod Bearing
- (2) AMM 49-52-02/401, Inlet Guide Vane Actuator

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	9	IGV Linkage Rod End Bearing	49-52-01	01	115

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 424-007

- (1) Install the linkage rod bearing for the IGV:
  - (a) Install the jamnut (10) on the linkage rod bearing (9).
  - (b) Install the linkage rod bearing (9) on the IGV connector rod.
  - (c) Adjust the linkage rod bearing for the IGV (Ref 49-52-01/501).
  - (d) Attach the linkage rod bearing (9) to the IGV bellcrank with the bolt (8) and the nut (7).
    - 1) Tighten the nut (7) to 40-42 inch-pounds (4.5-4.7 newton-meters).
  - (e) Use a wrench on the flat areas of the connector rod to hold the rod.
  - (f) While you hold the connector rod with the wrench, tighten the jamnut (10) to 35-37 inch-pounds (4.0-4.2 newton-meters).
  - (g) Install a lockwire on the jamnut (10).
  - (h) Install the IGV actuator (AMM 49-52-02/401).
  - (i) Attach the IGV cover (6) to the APU with bolts (3 and 4), the washers (2 and 5), and the nut (1).
    - 1) Tighten the bolt (4) and the nut (1) to 100-120 inch-pounds (11.3-13.6 newton-meters).

EFFECTIVITY

ALL

49-52-01

01

Page 405  
Aug 22/05

S 414-008

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Panel

1) 11B35 APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-52-01

03

Page 406  
Aug 22/01

INLET GUIDE VANE LINKAGE ROD END BEARING – ADJUSTMENT/TEST

1. General

- A. This procedure contains an adjustment task for the end bearing on the linkage rod for the inlet guide vane (IGV). This task is applicable for all the IGV bellcrank configurations.
- B. The IGV actuator is on the lower left side of the APU, forward of the air inlet plenum. You can get access to the IGV actuator and the linkage rod bearing through the APU access doors.

TASK 49-52-01-805-001

2. IGV Linkage Rod Bearing Adjustment (Fig. 501)

A. Standard Tools and Equipment

- (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel

B. References

- (1) AMM 49-52-01/401, Inlet Guide Vane Linkage Rod Bearing
- (2) AMM 49-52-02/401, Inlet Guide Vane Actuator

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

D. Procedure

S 865-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 865-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

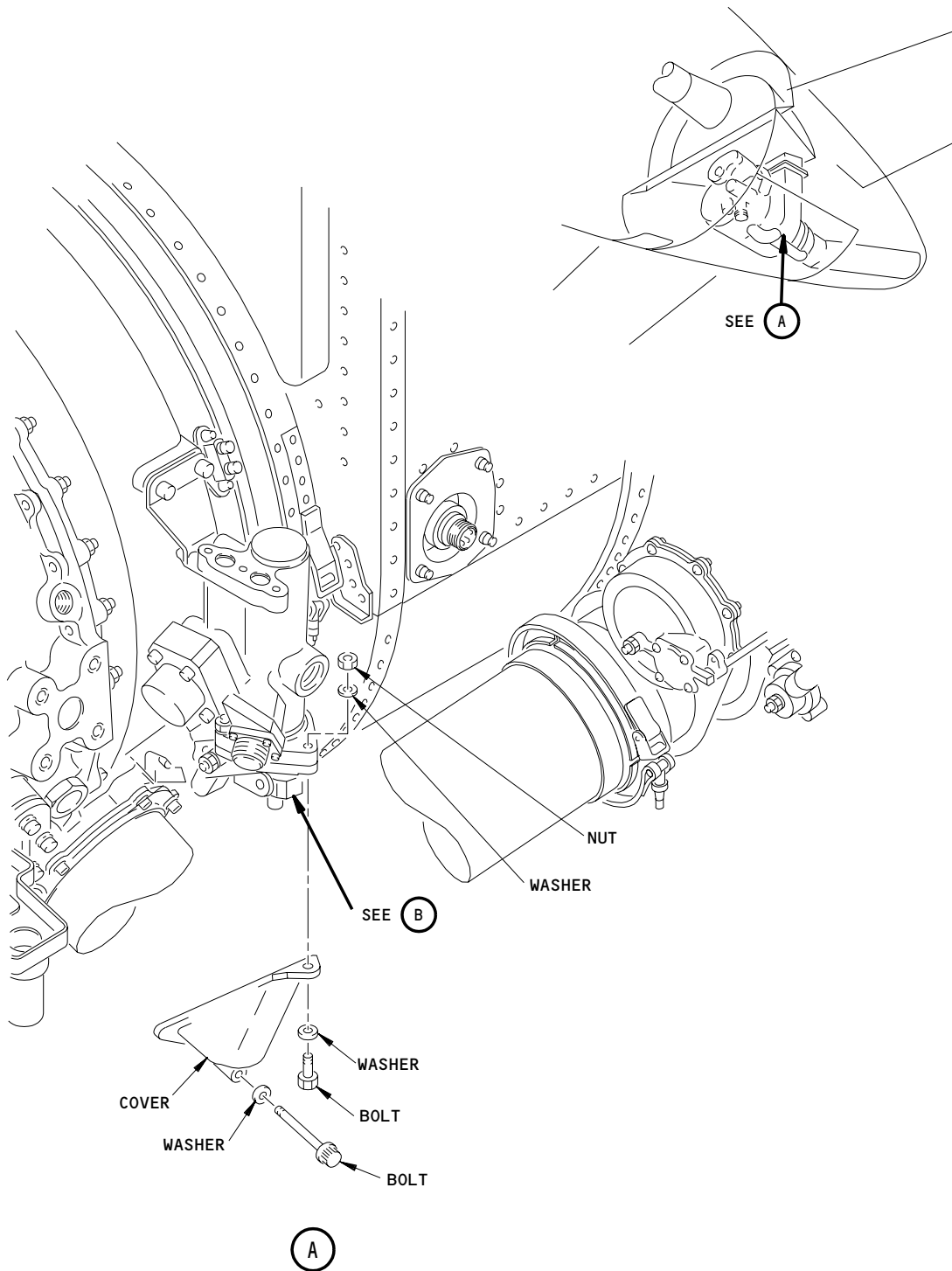
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ALL

49-52-01

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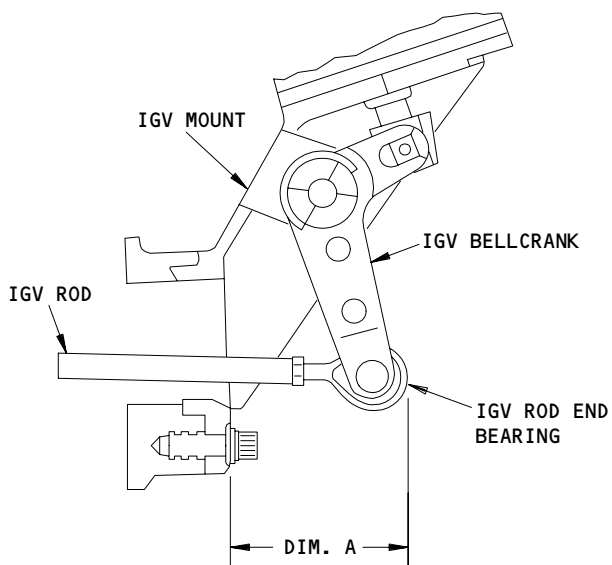
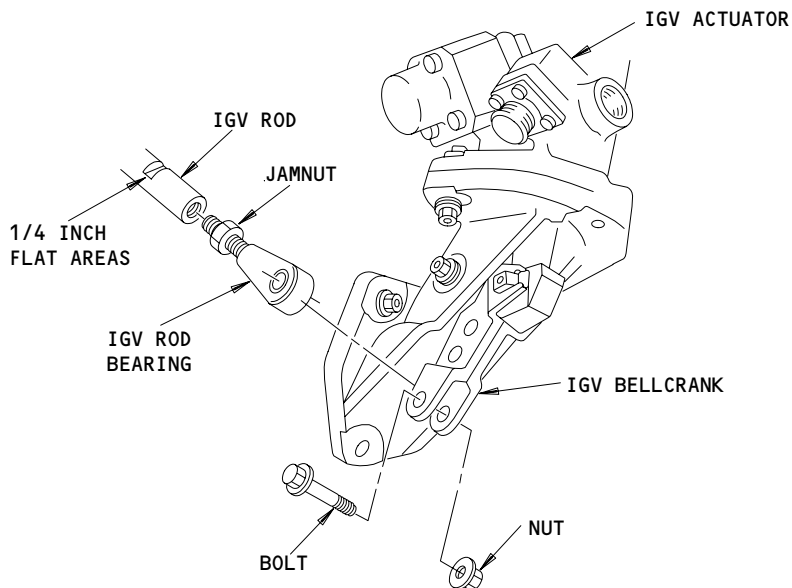
Page 501  
Aug 22/01



IGV Linkage Rod End Bearing Adustment  
Figure 501 (Sheet 1)

EFFECTIVITY	
	ALL

49-52-01



(B)

IGV Linkage Rod End Bearing Adjustment  
Figure 501 (Sheet 2)

EFFECTIVITY	
	ALL

49-52-01

01

Page 503  
Feb 10/95



- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 015-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 015-005

- (4) Get access to the IGV rod end:
  - (a) Remove the bolts, the washers, and the nut that attach the IGV cover to the APU.
  - (b) Remove the IGV cover from the APU.
  - (c) Do the IGV force check and remove the IGV actuator (AMM 49-52-02/401).

S 825-012

- (5) Adjust the IGV linkage:
  - (a) Make sure the word "OUT", on the chamfer side of the block assembly, points outboard of the APU to prevent IGV linkage damage.
  - (b) Make sure the bolt is installed that attaches the IGV rod end to the IGV bellcrank.
  - (c) Use a wrench on the flat areas of the IGV rod to hold the rod in its position.
  - (d) While you hold the rod with the wrench, loosen the jamnut on the IGV rod bearing.
  - (e) With the bellcrank connected, pull the rod end to open the inlet guide vanes.

EFFECTIVITY

ALL

49-52-01

03

Page 504  
Aug 22/01

- (f) Move the IGV bellcrank linkage as far as possible.
- (g) Measure the dimension A from the IGV mount to the end of the rod end.
- (h) If the dimension A is not the same as the dimension measured during the bearing removal (AMM 49-52-01/401), adjust the linkage:
  - 1) Remove the nut and the bolt that attach the IGV rod to the IGV bellcrank.
  - 2) Turn the rod end bearing until the dimension A is correct.

S 435-008

- (6) Connect the IGV bellcrank:
  - (a) Align the attachment holes in the IGV rod bearing and the IGV bellcrank.
  - (b) Connect the IGV rod bearing to the IGV bellcrank with the bolt and the nut.
    - 1) Tighten the nut to 40-42 inch-pounds (4.5-4.7 newton-meters).
  - (c) Hold the IGV rod with a wrench and tighten the jamnut to 35-37 inch-pounds (4.0-4.2 newton-meters).
    - 1) Install a lockwire on the jamnut.
  - (d) Install the IGV actuator (AMM 49-52-02/401).
  - (e) Attach the IGV cover to the APU with the bolts, the washers, and the nut.
    - 1) Tighten the bolt and the nut to 100-120 inch-pounds (11.3-13.6 newton-meters).

S 415-009

- (7) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.  
  

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
  - (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
  - (c) Lift the left access door until the two APU access doors are approximately aligned.
  - (d) Close the two APU access doors.
  - (e) Close the four latches on the right access door.

S 865-010

- (8) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-52-01

03

Page 505  
Aug 22/01

 **BOEING**  
767  
MAINTENANCE MANUAL

- 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 865-011

- (9) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

**49-52-01**

02

Page 506  
Aug 22/01

INLET GUIDE VANE ACTUATOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the tasks for the removal and the installation of the actuator for the inlet guide vanes (IGVs).
- B. The IGV actuator is on the lower left side of the APU, forward of the air inlet plenum. You can get access to the actuator through the APU access doors.

TASK 49-52-02-004-001

2. Inlet Guide Vane (IGV) Actuator Removal (Fig. 401 and 402)

- A. Standard Tools and Equipment
  - (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel
  - (2) Tester – Force Scale, DDP-75, Chatillion John and Sons, Scale and Spring Division, Kern Gardens, New York 11415

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

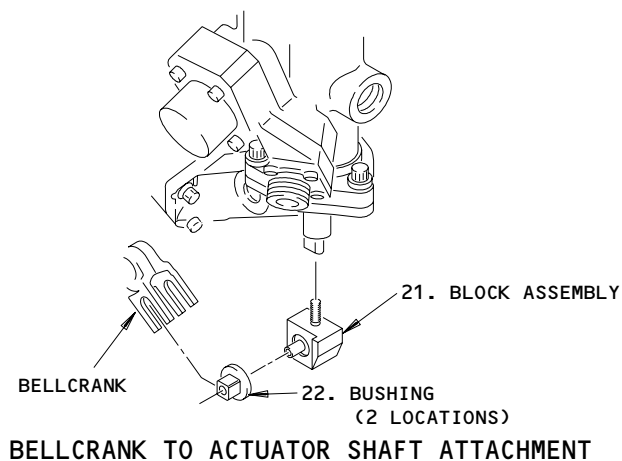
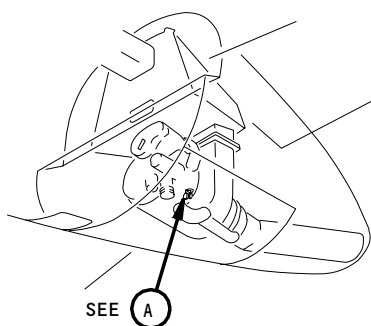
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ALL

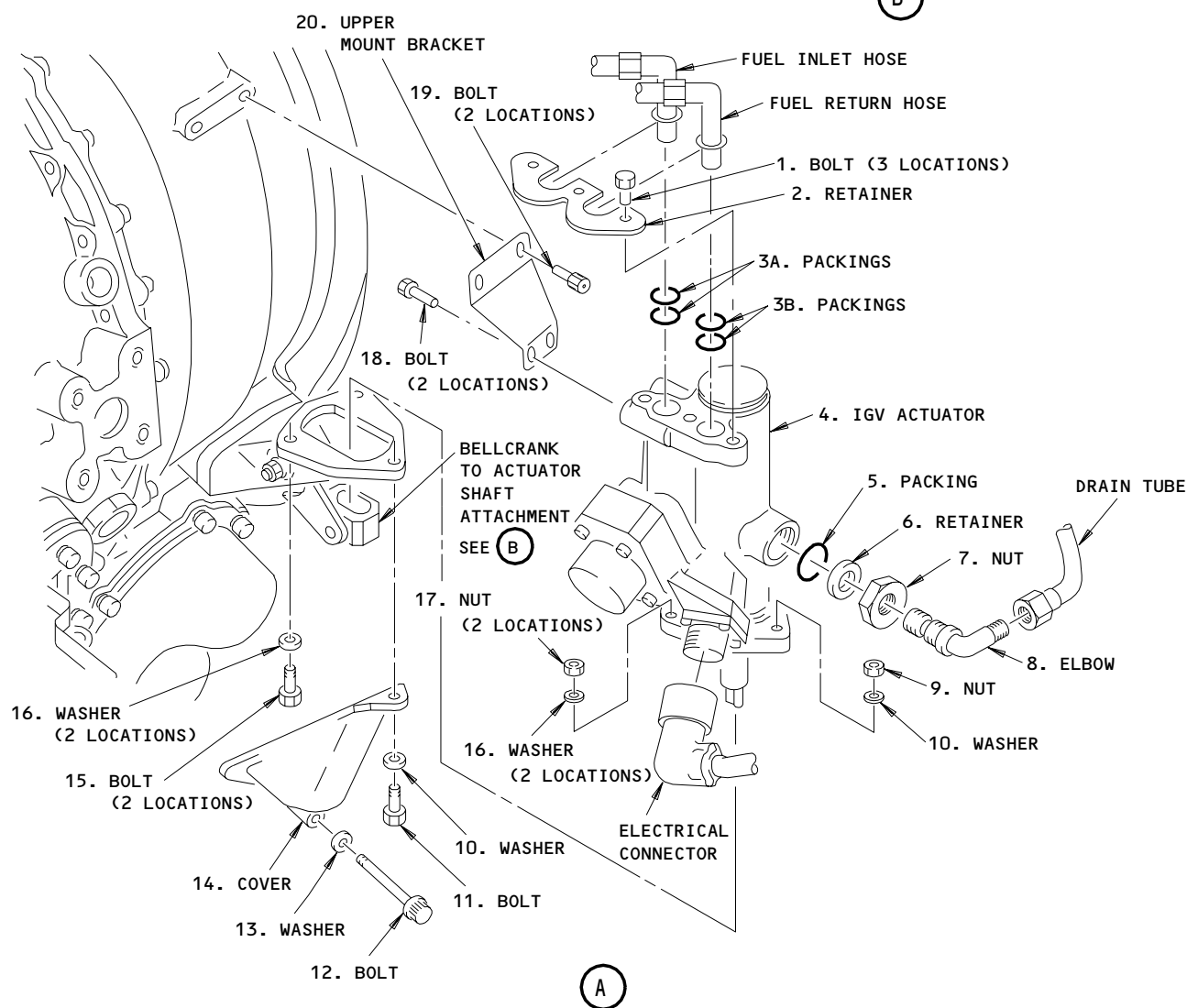
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01

Page 401  
Aug 22/01



(B)



(A)

Inlet Guide Vane Actuator Installation  
Figure 401

EFFECTIVITY

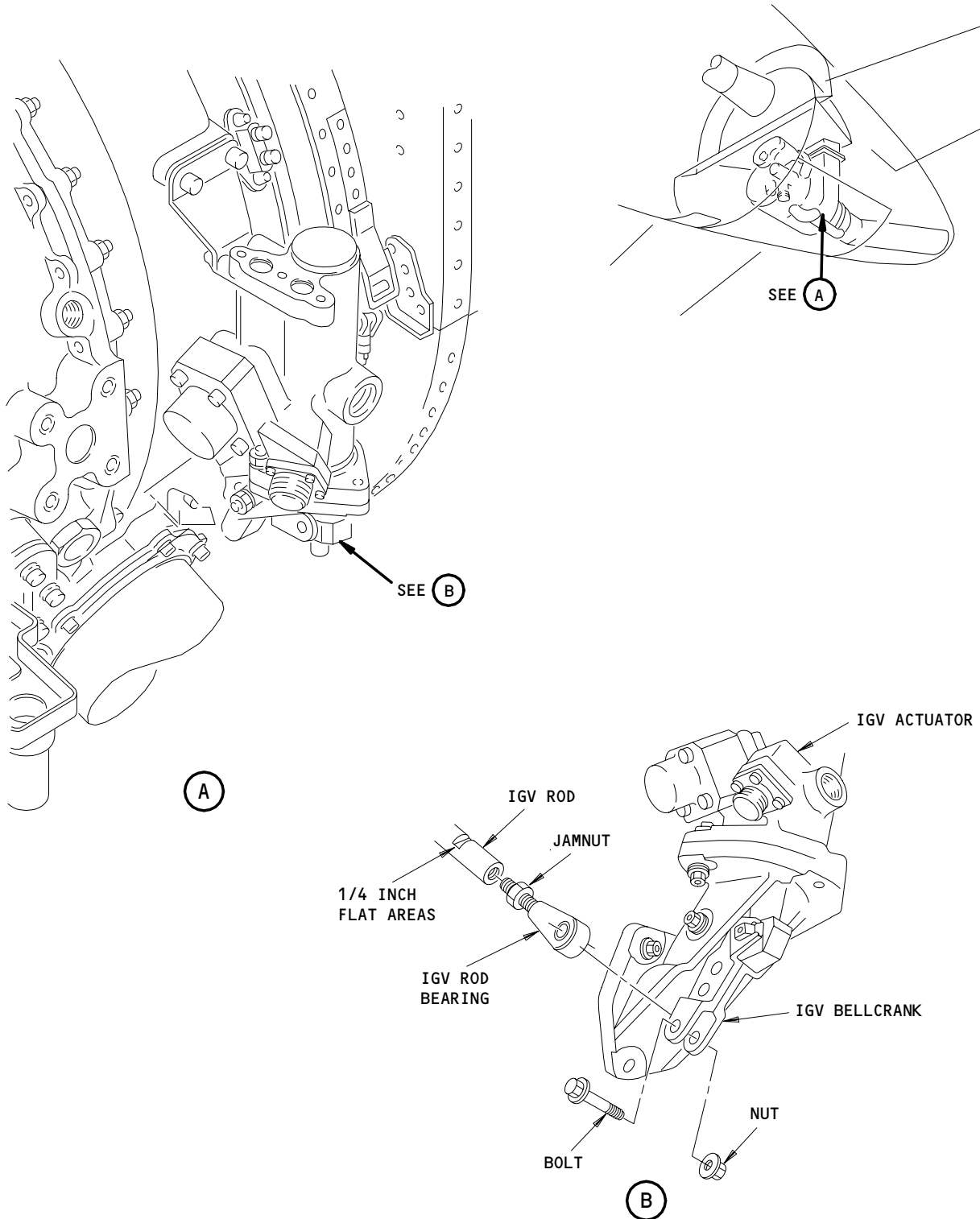
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49-52-02

02

Page 402  
Aug 10/91

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IGV Opening Force Check  
Figure 402

EFFECTIVITY	
	ALL

49-52-02

03

Page 403  
Nov 10/93

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- (b) P49, APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 014-038

- (4) Get access to the IGV actuator:

- (a) Put the container below the fuel control unit.

WARNING: BE CAREFUL WHEN YOU LOOSEN THE FUEL LINES AND MOVE THE IGV ACTUATOR. A SPRAY OF FUEL CAN COME FROM THE FUEL LINES. A SPRAY OF FUEL CAN CAUSE INJURY TO PERSONS.

- (b) Loosen the fuel inlet line and the return line on the fuel control unit.

NOTE: This will permit the movement of the IGV actuator shaft.

1) Let the fuel fully drain out of the fuel lines.

- (c) Remove the bolts (11 and 12), the washers (10 and 13), the nut (9), and the cover (14) from the bottom mounting bracket.

- (d) Remove the nut and the bolt that attach the IGV rod to the IGV bellcrank.

EFFECTIVITY

ALL

49-52-02

02

Page 404  
Aug 22/01

S 754-039

- (5) Do a check of the opening force that is necessary for the inlet guide vane:
- (a) Push the IGV linkage rod in until it stops.
    - 1) If the IGV linkage rod does not move, replace the APU (AMM 49-11-01/401).
  - (b) Connect the force scale tester to the IGV rod bearing.
  - (c) Pull the scale and measure the force that is necessary to open the inlet guide vanes.
    - 1) The opening force must not be more than 15 pounds (67 newtons).
  - (d) If the opening force is more than 15 pounds (67 newtons), replace the APU (AMM 49-11-01/401).
  - (e) If the opening force is 15 pounds (67 newtons) or less, the IGVs are satisfactory. Install the fuel inlet line and the return line on the fuel control unit.
  - (f) Attach the rod end bearing to the bellcrank with the bolt and the nut.
    - 1) Tighten the nut to 40-42 inch-pounds (4.5-4.8 newton-meters).

S 034-035

- (6) Disconnect the IGV actuator:
- (a) Disconnect the electrical connector from the actuator (4).
  - (b) Remove the bolts (1) and the retainer (2) from the actuator (4).

**WARNING:** STAY CLEAR WHEN YOU REMOVE THE FUEL HOSES OR MOVE THE IGV ACTUATOR SHAFT. FUEL WILL COME OUT OF THE FUEL HOSES AND ACTUATOR WHEN THE HOSES ARE DISCONNECTED AND CAN CAUSE INJURY.

- (c) Disconnect the fuel return hose and the fuel inlet hose from the IGV actuator.
  - 1) Remove and discard the packings (3A and 3B).
- (d) Put caps on the fuel hoses and the actuator.
- (e) Disconnect the drain tube from the elbow (8).
- (f) Remove the elbow (8), the nut (7), the retainer (6), and the packing (5) from the actuator (4).
  - 1) Remove and discard the packing (5).
  - 2) Put caps on the drain tube and the actuator.

S 024-033

- (7) Remove the IGV actuator:
- (a) Remove the two nuts (17), four washers (16) and two bolts (15) from the bottom mounting bracket.
  - (b) Remove the two bolts (19) from the upper mount bracket (20).

EFFECTIVITY

ALL

49-52-02

04

Page 405  
Dec 22/03



- (c) Push the bellcrank back until it is clear of the block assembly (21) and remove the two bushings (22) from the block assembly.
  - 1) Discard the two bushings (22).
- (d) Remove the bracket (20) with the actuator (4).
- (e) Remove the two bolts (18) and bracket (20) from the actuator (4).

TASK 49-52-02-404-014

3. Inlet Guide Vane (IGV) Actuator Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3A	Packing	49-31-00	01	44
	3B	Packing			48
	4	Actuator	49-52-02	02	140
	5	Packing			165
	22	Bushing			70

B. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit

C. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant - Petrolatum Jelly - VV-P-236

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

EFFECTIVITY

ALL

49-52-02

02

Page 406  
Aug 22/05

E. Procedure

S 424-034

- (1) Install the IGV actuator:

**CAUTION:** MAKE SURE THE BUSHINGS TURN FREELY ON THE BLOCK ASSEMBLY. IF THE BUSHINGS DO NOT TURN FREELY, DAMAGE TO THE IGV LINKAGE CAN OCCUR.

- (a) Install new bushings (22) on the block assembly (21).

**CAUTION:** MAKE SURE THE "OUT" ON THE CHAMFER SIDE OF THE BLOCK ASSEMBLY IS INSTALLED ON THE OUTBOARD SIDE. IF THE BLOCK ASSEMBLY IS NOT INSTALLED CORRECTLY, DAMAGE TO THE IGV LINKAGE CAN OCCUR.

- (b) Install the block assembly (21) in the actuator shaft.

**NOTE:** Use a thin-wall, one-half inch, open-end wrench to hold the actuator shaft.

- 1) Tighten the block assembly (21) to 120-125 inch-pounds (13.5-14.1 newton-meters).

- (c) Attach the upper mount bracket (20) to the actuator with the two bolts (18).

- 1) Tighten the two bolts (18) to 50-53 inch-pounds (5.7-6.0 newton-meters).

- (d) Put the actuator (4) and the block assembly (21) in their position through the bottom mounting bracket.

- (e) Attach the block assembly (21) to the bellcrank.

- 1) Make sure the "OUT" on the chamfer side of the block assembly is outboard of the APU.

- 2) Turn the bellcrank as necessary to install the block assembly in the arms of the bellcrank.

- (f) Attach the upper mount bracket (20) to the APU with the two bolts (19).

- 1) Tighten the two bolts (19) to 50-53 inch-pounds (5.7-6.0 newton-meters).

EFFECTIVITY

ALL

49-52-02

03

Page 407  
Dec 22/03

 **BOEING**  
767  
MAINTENANCE MANUAL

- (g) Attach the actuator to the bottom mounting bracket with the bolts (15), the washers (16), and the nuts (17).
  - 1) Tighten the nuts (17) to 100–120 inch-pounds (11.3–13.5 newton meters).

S 434-018

- (2) Attach the cover (14) with the bolts (11 and 12), the washers (10 and 13), and the nut (9).
  - (a) Tighten the bolt (12) and the nut (9) to 100–120 inch-pounds (11.3–13.5 newton-meters).

S 434-036

- (3) Connect the IGV actuator:
  - (a) Lubricate the new packing (5) with a light coat of lubricant.
  - (b) Install the elbow (8), the nut (7), the retainer (6), and the packing (5) on the actuator (4).
  - (c) Connect the drain tube to the elbow (8).
  - (d) Lubricate the new packings (3A and 3B) with a light coat of lubricant.
  - (e) Install the packings (3A and 3B) on the fuel inlet and fuel return hoses.
  - (f) Connect the fuel inlet and fuel return hoses to the actuator (4).
  - (g) Attach the retainer (2) to the actuator (4) with the bolts (1).
  - (h) Connect the electrical connector to the actuator.

S 864-037

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49, APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11, Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 744-026

- (5) Do this task: APU Control Unit – Self-Test (AMM 49-61-05/201).

EFFECTIVITY

ALL

49-52-02

02

Page 408  
Dec 22/03

- S 864-027
- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

- S 794-029
- (7) Do a leakage check of the APU:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the APU for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

- S 414-032
- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:
- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-52-02

02

Page 409  
Dec 22/03

INLET GUIDE VANE LINKAGE BELLCRANK – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the linkage bellcrank for the inlet guide vanes (IGV).
- B. The IGV linkage bellcrank connects the IGV actuator shaft to the IGV connector rod. The bellcrank is on the bottom of the IGV actuator.
- C. The IGV actuator is the bottom left side of the APU, forward of the air inlet plenum. You can get access to the IGV actuator through the APU access doors.

TASK 49-52-03-004-001

2. IGV Linkage Bellcrank Removal (Fig. 401)

- A. Standard Tools and Equipment
  - (1) Container – 1 U.S. Gallon (4 Liter) capacity, for fuel
- B. References
  - (1) AMM 49-52-01/401, Inlet Guide Vane Linkage Rod End Bearing
- C. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment – Right
  - 211 Flight Compartment – Left
  - 212 Flight Compartment – Right
  - 315 APU Compartment – Left
  - 316 APU Compartment – Right

- (2) Access Panels
  - 315AL APU Access Door – Left
  - 316AR APU Access Door – Right
  - 822 Aft Cargo Door

D. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-52-03

01

Page 401  
Aug 22/01

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the IGV linkage bellcrank:

- (a) Disconnect the electrical connector from the IGV actuator.
- (b) Put the container below the fuel control unit.

WARNING: BE CAREFUL WHEN YOU LOOSEN THE FUEL LINES AND MOVE THE IGV ACTUATOR SHAFT. A SPRAY OF FUEL CAN COME FROM THE FUEL LINES. A SPRAY OF FUEL CAN CAUSE INJURY TO PERSONS.

- (c) Loosen the fuel inlet line and the return line on the Fuel control unit.

NOTE: This will permit the movement of the IGV actuator shaft.

1) Let the fuel fully drain from the fuel lines.

- (d) Remove the nut (1), the washers (2 and 5), and the bolts (3 and 4) that attach the IGV cover (6) to the APU.
- (e) Remove the IGV cover (6) from the APU.
- (f) Push the IGV actuator shaft up until it stops.
- (g) Remove the nut (14) and bolt (12) that attach the connector rod to the bellcrank (11).

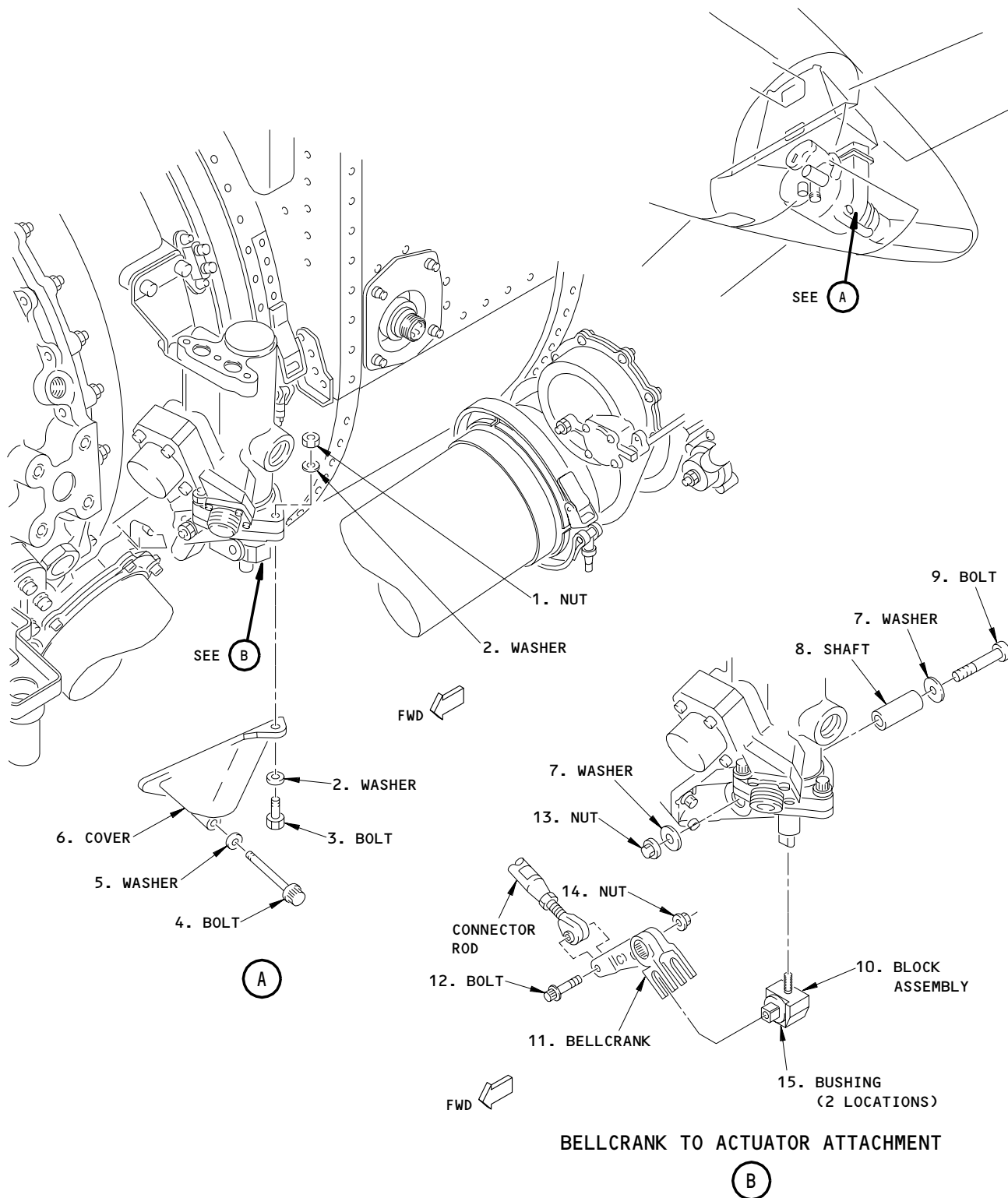
EFFECTIVITY

ALL

49-52-03

04

Page 402  
Aug 22/04



IGV Linkage Bellcrank Installation  
Figure 401

EFFECTIVITY	
	ALL

49-52-03

- (h) Remove the nut (13), two washers (7), shaft (8) and bolt (9) that attach the bellcrank (11) to the IGV actuator.
- (i) Remove the bellcrank (11) and two bushings (15) from the IGV actuator and block assembly (10).

S 214-006

- (5) Examine the bearing on the end of the connector rod for worn areas and damage.
  - (a) Replace the connector rod bearing if it is necessary (AMM 49-52-01/401).

TASK 49-52-03-404-007

3. IGV Linkage Bellcrank Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	15	IGV Linkage Bellcrank	49-52-03	01	60 or 65

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 424-008

- (1) Install the IGV bellcrank:

EFFECTIVITY

ALL

**49-52-03**

03

Page 404  
Aug 22/05



**CAUTION:** MAKE SURE THE BUSHINGS TURN FREELY ON THE BLOCK ASSEMBLY. IF THE BUSHINGS DO NOT TURN FREELY, DAMAGE TO THE IGV LINKAGE CAN OCCUR.

**CAUTION:** MAKE SURE THE WORD "OUT", ON THE CHAMFER SIDE OF THE BLOCK ASSEMBLY, FACES OUTBOARD OF THE APU. DAMAGE TO THE IGV LINKAGE CAN OCCUR IF THE BLOCK ASSEMBLY IS NOT CORRECTLY INSTALLED.

- (a) Install the two bushings (15) on the block assembly (10) and then attach the block assembly to the arms of the bellcrank (11).

**NOTE:** If it is necessary, you can extend or retract the actuator shaft to align the bellcrank pivot point.

- (b) Put the bellcrank (11) in its position on the IGV actuator.
- (c) Install the shaft (8) through the IGV actuator and bellcrank (11).
- (d) Attach the bellcrank (11) to the IGV actuator with the bolt (9), two washers (7) and nut (13).
  - 1) Tighten the nut (13) to 40-42 inch-pounds (4.5-4.7 newton-meters).
- (e) Turn the bellcrank (11) until the IGV connector rod aligns with the bellcrank.
- (f) Attach the bellcrank (11) to the connector rod bearing with the bolt (12) and nut (14).
  - 1) Tighten the nut (14) to 40-42 inch-pounds (4.5-4.7 newton-meters).
- (g) Attach the IGV cover (6) to the APU with the bolts (3 and 4), the washers (2 and 5), and the nut (1).
  - 1) Tighten the bolt (4) and the nut (1) to 100-120 inch-pounds (11.3-13.6 newton-meters).
- (h) Tighten the fuel inlet line and the return line on the fuel control unit.
- (i) Connect the electrical connector to the IGV actuator.

S 414-011

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.

EFFECTIVITY

ALL

49-52-03

02

Page 405  
Aug 22/05

 **BOEING**  
767  
MAINTENANCE MANUAL

- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-52-03

02

Page 406  
Aug 22/05

APU SURGE BLEED SYSTEM – DESCRIPTION AND OPERATION

1. General

A. APU Surge Bleed System (Fig. 1)

- (1) The surge bleed system for the APU keeps a sufficient airflow through the load compressor to prevent a stall or a surge. The surge valve opens to release the unwanted discharge pressure from the load compressor. The surge bleed system contains these components:
  - (a) The surge valve
  - (b) The total pressure sensor
  - (c) The total pressure transducer
  - (d) The differential pressure transducer
  - (e) The variable volume chamber
  - (f) The static pressure sensor.
- (2) On some APUs, there is an easily replaceable flow sensing module which contains most of the surge system components. This module is installed by Garrett SB GTC331-49-5840. The module contains these surge system components:
  - (a) The total pressure sensor
  - (b) The total pressure transducer
  - (c) The differential pressure transducer
  - (d) The variable volume chamber
  - (e) The static pressure sensor.
- (3) APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711); The flow sensing module contains the total pressure transducer, differential pressure transducer and variable volume chamber. The flow sensor (total pressure probe and static pressure sensor) is not attached to the flow sensing module.

2. Component Details

A. Surge Valve (Fig. 2)

- (1) The surge valve is four inches in diameter. It is spring-loaded in the open position, and is a flow modulating valve. It consists of a butterfly, valve actuator, servo valve torque motor, pressure regulator, relief valve and quick dump element. The second stage compressor provides pressure to open the actuator which is regulated to 40 psi. The APU control unit electronically controls the surge valve torque-motor. The torque motor action regulates the servo valve pressure that controls the pressure to close the actuator. The relief valve protects against overpressurization. The quick dump element opens the valve quickly. The surge valve is located on the surge bleed duct just aft of the tee duct for the bleed air.

B. Pressure Sensors (Fig. 3)

- (1) A sensing ring for static pressure is mounted between the discharge scroll for the load compressor and the tee duct for the bleed air. It contains eight sensing ports which provide the differential pressure transducer with an average static pressure.

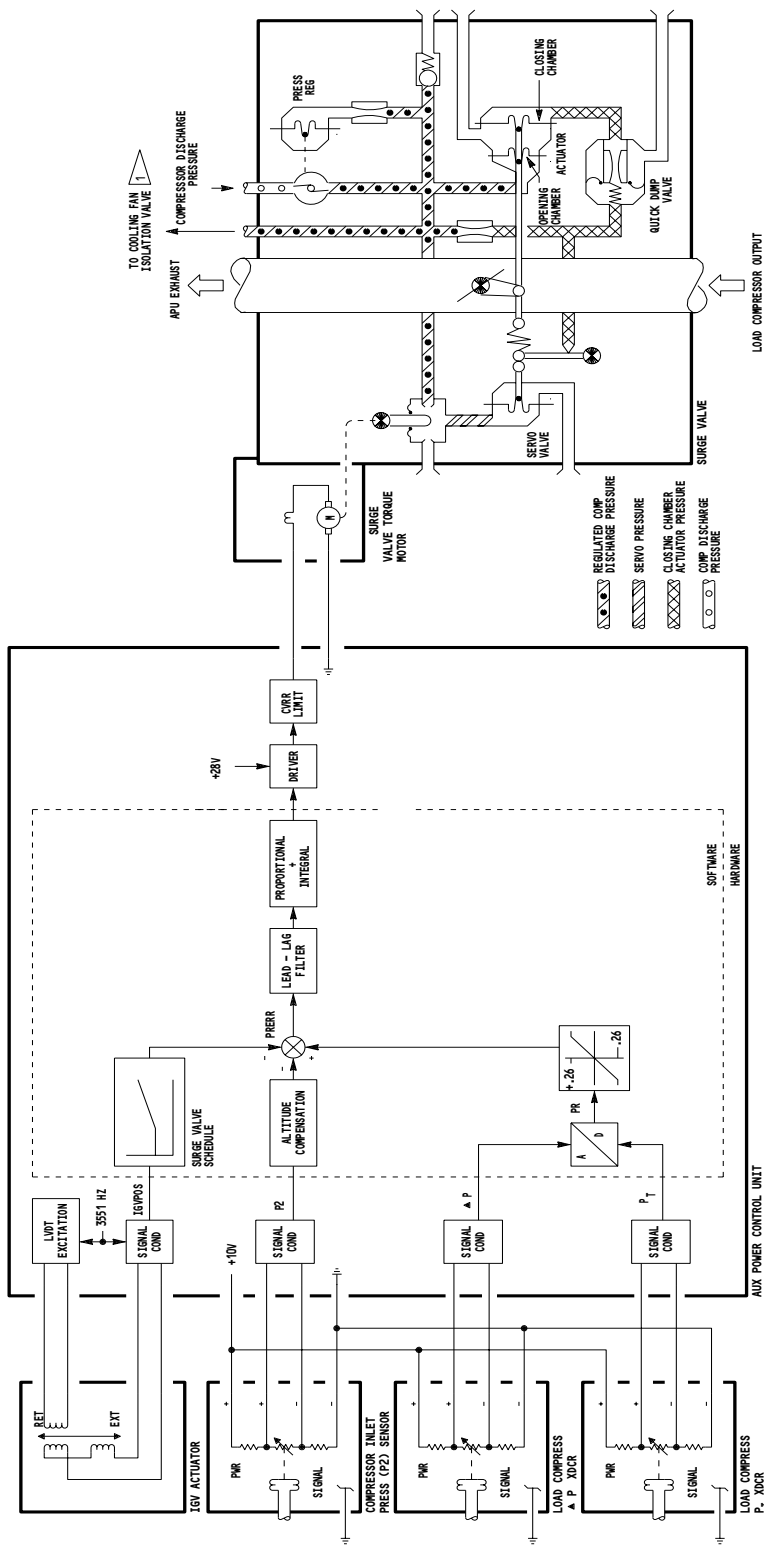
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49-53-00

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Page 1  
Aug 22/04



NOT ON APUS WITH FAN ISOLATION VALVE CONNECTED TO FIRST STAGE COMPRESSOR

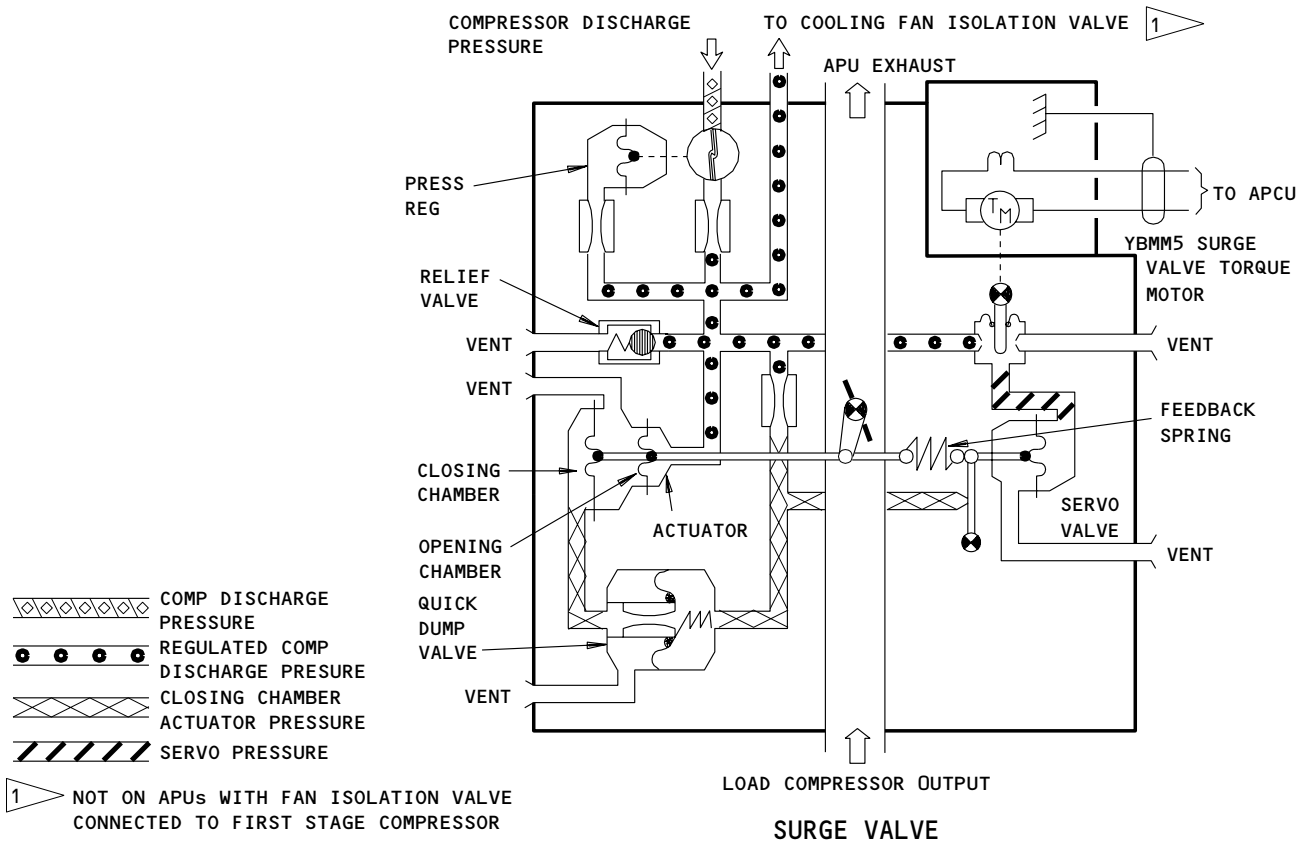
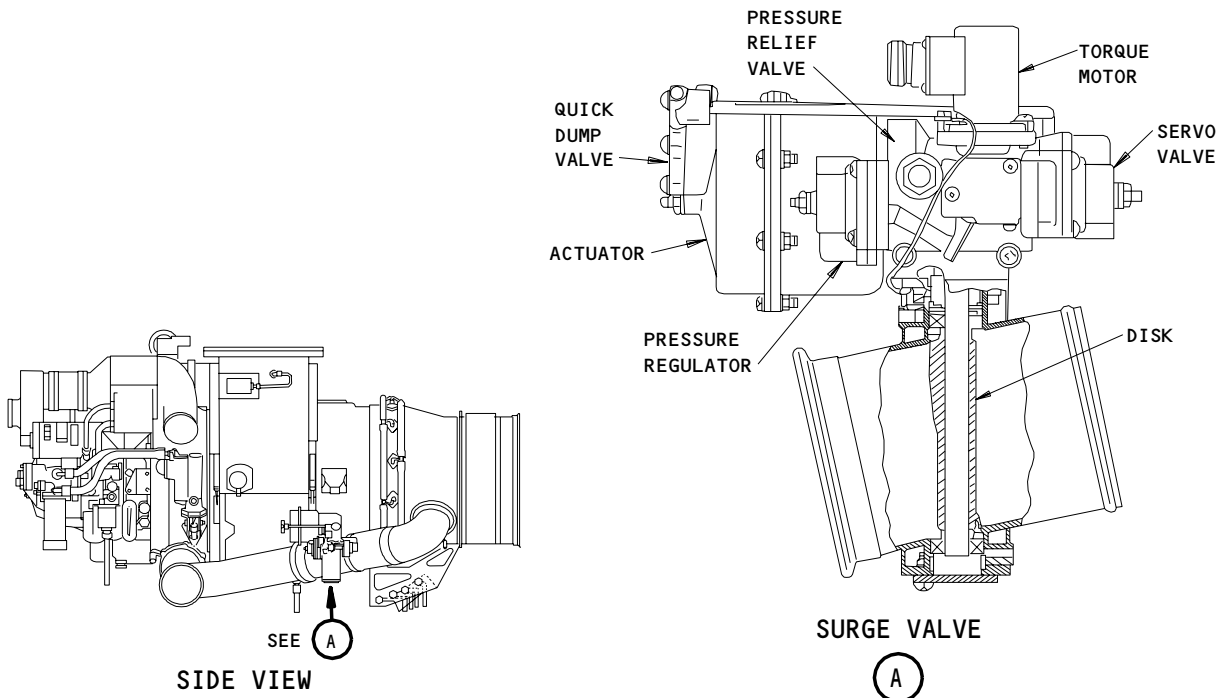
APU Surge Bleed System  
Figure 1

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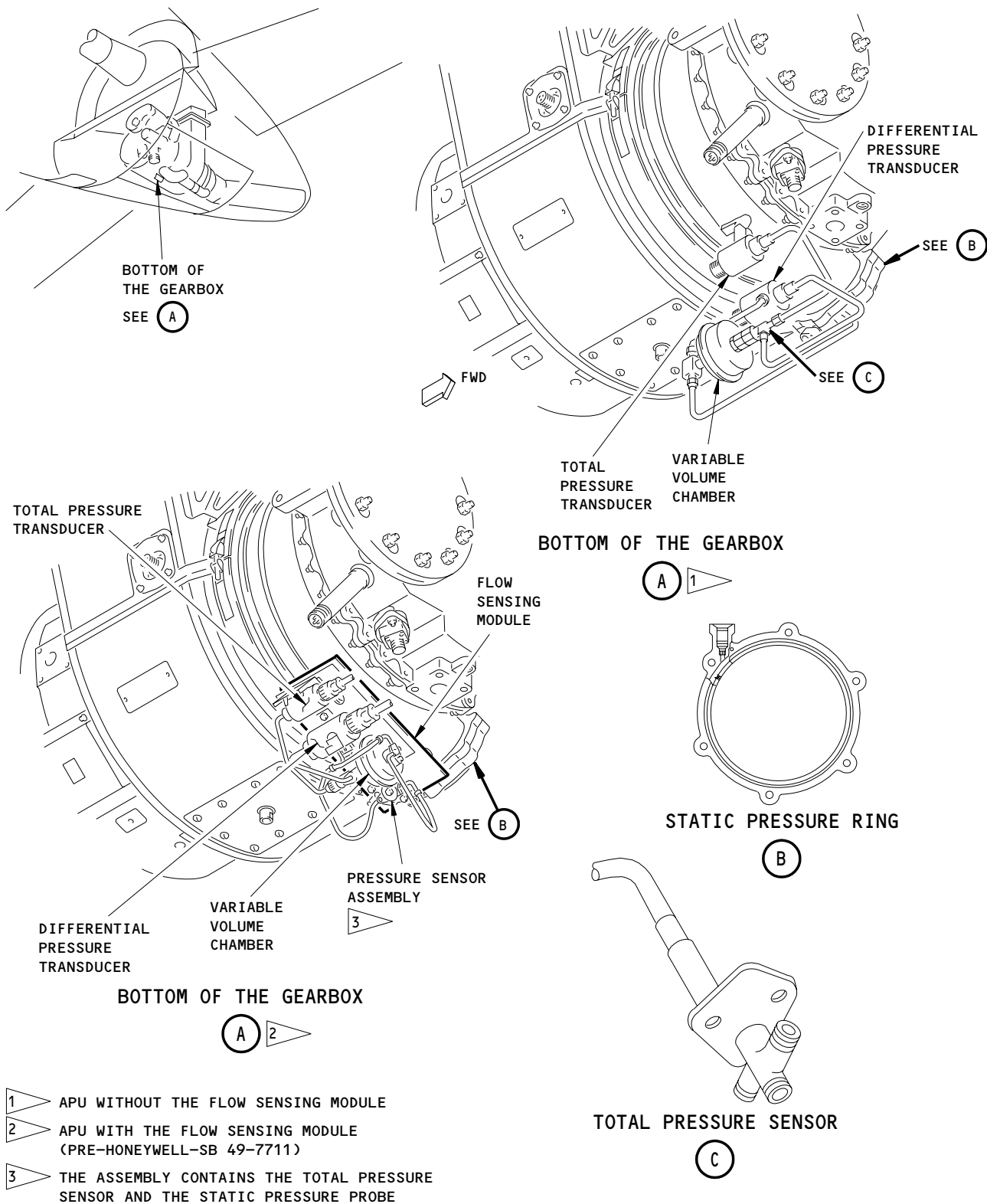
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APU Surge Valve Location  
Figure 2

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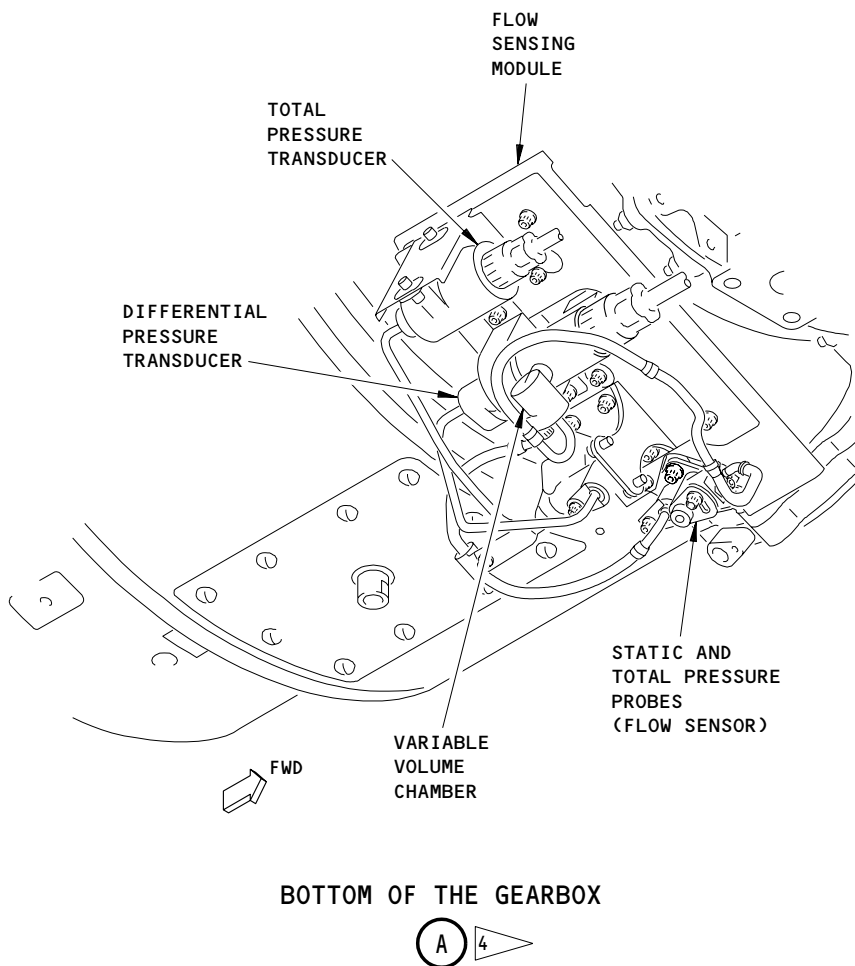
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APU Surge Bleed Sensors and Transducers  
Figure 3 (Sheet 1)

EFFECTIVITY	
	ALL

49-53-00



4 APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711)

APU Surge Bleed Sensors and Transducers  
Figure 3 (Sheet 2)

EFFECTIVITY ———  
ALL

49-53-00

01

Page 5  
Aug 22/04

437458

- (2) APU WITH THE FLOW SENSING MODULE;  
The static pressure ring is not used for the static pressure. There is a static pressure sensor in the pressure sensor assembly on the module. This sensor gives an average static pressure to the differential pressure transducer.
  - (3) APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711);  
The flow sensor (total pressure probe and static pressure sensor) is not attached to the flow sensing module. The static pressure sensor is adjustable under APU test cell conditions. The flow sensor is installed on the APU scroll housing and is adjusted to match the compressor characteristics of the APU (crack point of the surge valve). This adjustment will cause a reduction of the overall surge system tolerance and improve the transient response. The flow sensor must not be removed or replaced while the APU is installed on the airplane. You must replace the defective flow sensor in the APU test cell since an adjustment test of the flow sensor is necessary.
  - (4) APU WITHOUT THE FLOW SENSING MODULE;  
A total pressure sensor is installed adjacent to the static pressure ring on the load compressor discharge scroll.
  - (5) APU WITH THE FLOW SENSING MODULE;  
A total pressure sensor is installed on the pressure sensor assembly on the module.
  - (6) The total pressure sensor measures the total pressure of the bleed air. The sensor gives this pressure to the differential and the total pressure transducers.
  - (7) APU WITHOUT THE FLOW SENSING MODULE;  
The variable volume chamber is installed between the total pressure and the static pressure sensor outputs.
  - (8) APU WITH THE FLOW SENSING MODULE;  
The variable volume chamber is installed adjacent to the pressure sensor assembly on the flow sensing module.
  - (9) The variable volume chamber prevents damage to the differential pressure transducer caused by a negative differential pressure during a reverse flow condition in the surge bleed system.
- C. Pressure Transducers (Fig. 3)
- (1) The differential pressure transducer measures the difference between the total and static pressure inputs. It converts this pressure into an electrical signal supplied to the APU control unit.
  - (2) The total pressure transducer transforms the total pressure into an electrical signal. The transducers are mounted side by side on the discharge scroll for the load compressor. Both transducers are of a piezoresistive, solid-state type.

EFFECTIVITY

ALL

49-53-00

01

Page 6  
Aug 22/04



3. Operation

A. Functional Description

(1) Surge Bleed System (Fig. 1)

- (a) The total and differential pressure transducers supply total pressure (Pt) to the load compressor and differential pressure ( $\Delta P$ ) values to the APU control unit. The control unit selects a  $\Delta P/Pt$  setpoint based on the position of the inlet guide vanes. It compares the actual value from the transducers to the setpoint and controls the surge valve accordingly. When the actual value is above the setpoint, the valve is closed, and when it is below the setpoint, the valve is opened.
- (b) When the engine is not operating, the surge bleed valve is open. During engine start, the inlet guide vanes are closed and the surge valve remains open. The surge valve is closed for normal aircraft requirements but will modulate when the aircraft system is not using pneumatic power.

B. BITE

- (1) The APU control unit monitors the operation of the surge bleed system, tests component circuits, and writes any failures found in BITE memory (AMM 49-61-00/001). A failure of the total pressure transducer, the differential pressure transducer, or the surge bleed valve is shown on the FAULTY LRU matrix. These failures are shown as PT SENSOR,  $\Delta P$  SENSOR, or SURGE VALVE. An automatic shutdown because of REVERSE FLOW, START ABORTED, or ECU is shown on the REASON APU NOT OPERATING matrix.

EFFECTIVITY

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




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
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Page 7  
Aug 22/04

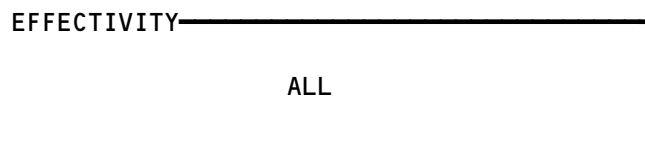
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FAULT ISOLATION/MAINT MANUAL

APU SURGE BLEED SYSTEM

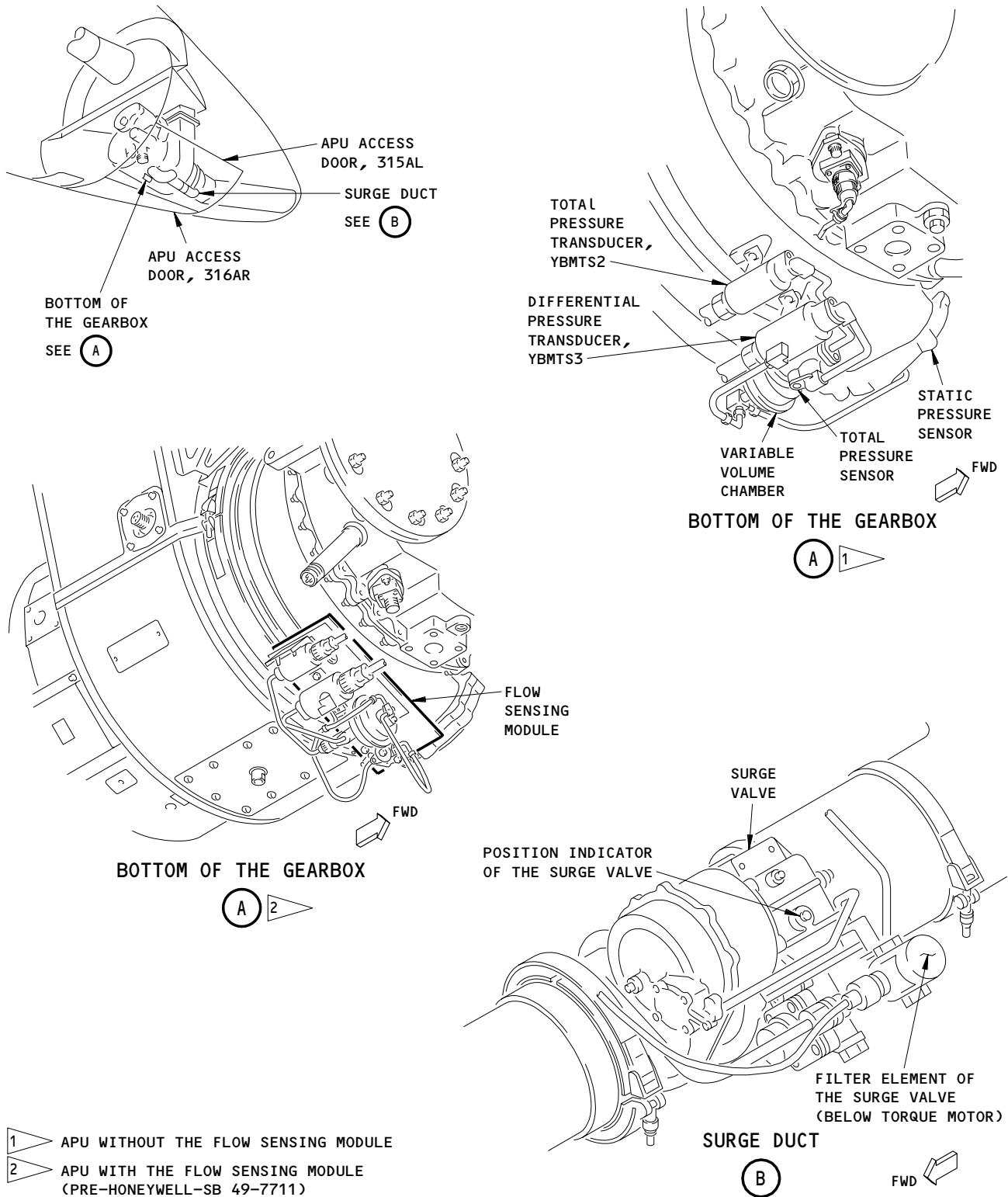
COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
ELEMENT - SURGE VALVE FILTER	--	1	315AL,316AR, APU COMPT, SURGE DUCT	49-53-06
MODULE - FLOW SENSING 	--	1	315AL,316AR, APU COMPT, BOTTOM OF GEARBOX	49-53-08
SENSOR - STATIC PRESSURE 	--	1	315AL,316AR, APU COMPT, BOTTOM OF GEARBOX	49-53-05
SENSOR - TOTAL PRESSURE FLOW 	--	1	315AL,316AR, APU COMPT, BOTTOM OF GEARBOX	49-53-03
TRANSDUCER - DIFFERENTIAL PRESSURE, YBMTS3 	--	1	315AL,316AR, APU COMPT, BOTTOM OF GEARBOX	49-53-04
TRANSDUCER - TOTAL PRESSURE, YBMTS2 	--	1	315AL,316AR, APU COMPT, BOTTOM OF GEARBOX	49-53-02
VALVE - SURGE, YBMM5	--	1	315AL,316AR, APU COMPT, SURGE DUCT	49-53-01

-  APUs WITHOUT THE FLOW SENSING MODULE
-  APUs WITH THE FLOW SENSING MODULE

APU Surge Bleed System - Component Index  
Figure 101



49-53-00



APU Surge Bleed System - Component Location  
Figure 102 (Sheet 1)

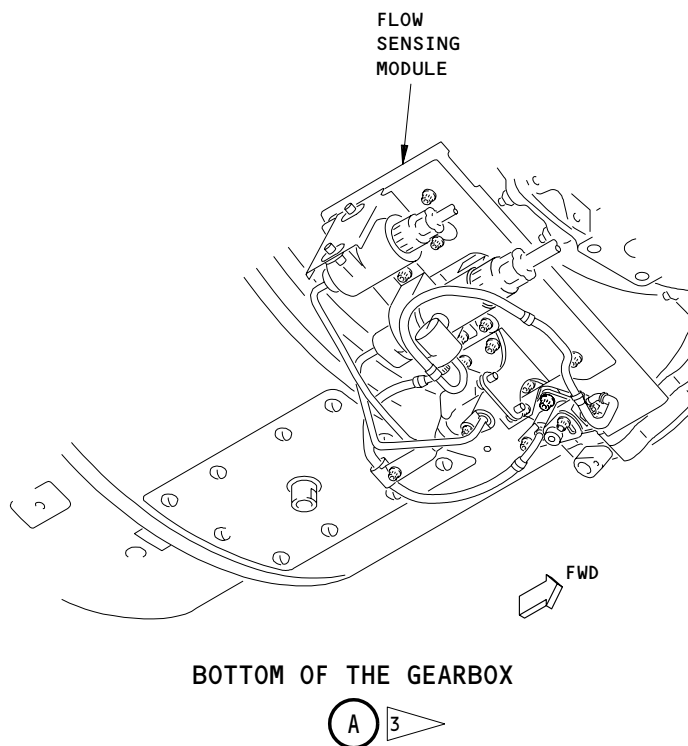
EFFECTIVITY

ALL

49-53-00

01

Page 102  
Aug 22/04



3 APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711)

APU Surge Bleed System - Component Location  
 Figure 102 (Sheet 2)

EFFECTIVITY	
	ALL

**49-53-00**

01

Page 103  
 Aug 22/04

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SURGE CONTROL VALVE – REMOVAL/INSTALLATION

1. General

- A. There are two tasks in this procedure. The first task is the removal of the surge control valve. The second task is the installation of the surge control valve.
- B. The surge control valve is installed on the left side of the APU compressor.
- C. SURGE CONTROL VALVES WITH A DRAIN HOLE ON THE PRESSURE SUPPLY TUBE (HONEYWELL POST-SB GTCP331-49-7496 OR HONEYWELL POST-SB GTCP331-49-7707); The pressure supply tube for the surge control valve has a 0.030 inch (0.76 mm) drain hole at the lowest point on the tube. The drain hole will remove moisture or other fluids before it can collect and restrict the air necessary for correct operation of the surge control valve. If there was no drain hole on the pressure supply tube and moisture or other fluids freeze when the APU is in cold temperature conditions, low duct pressure problems can occur.

TASK 49-53-01-004-001

2. Surge Control Valve Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Prepare for the Surge Control Valve Removal

S 864-002

- (1) Make sure the APU control switch is in the OFF position and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

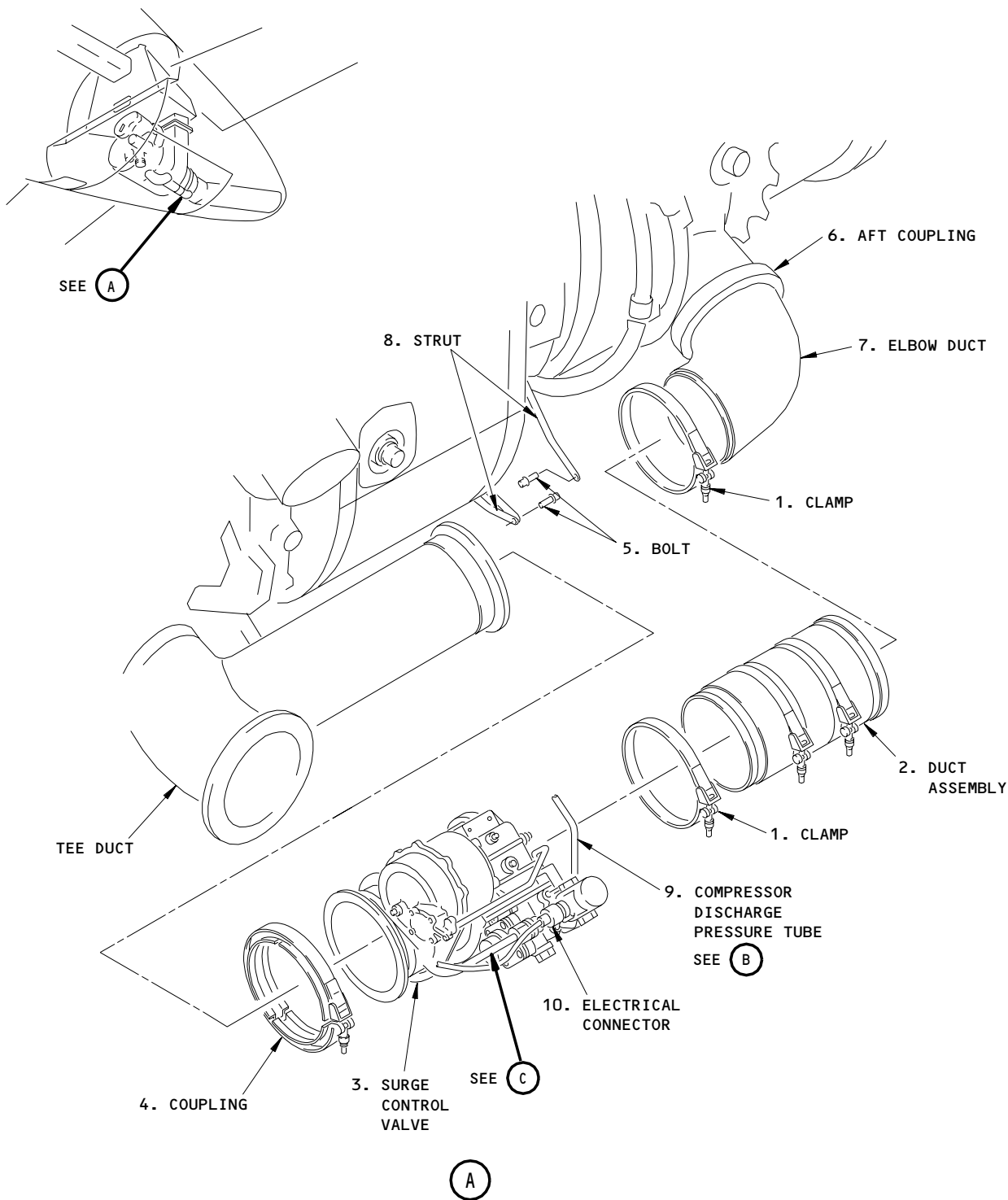
EFFECTIVITY

ALL

49-53-01

03

Page 401  
Aug 22/05



Surge Control Valve Installation  
Figure 401 (Sheet 1)

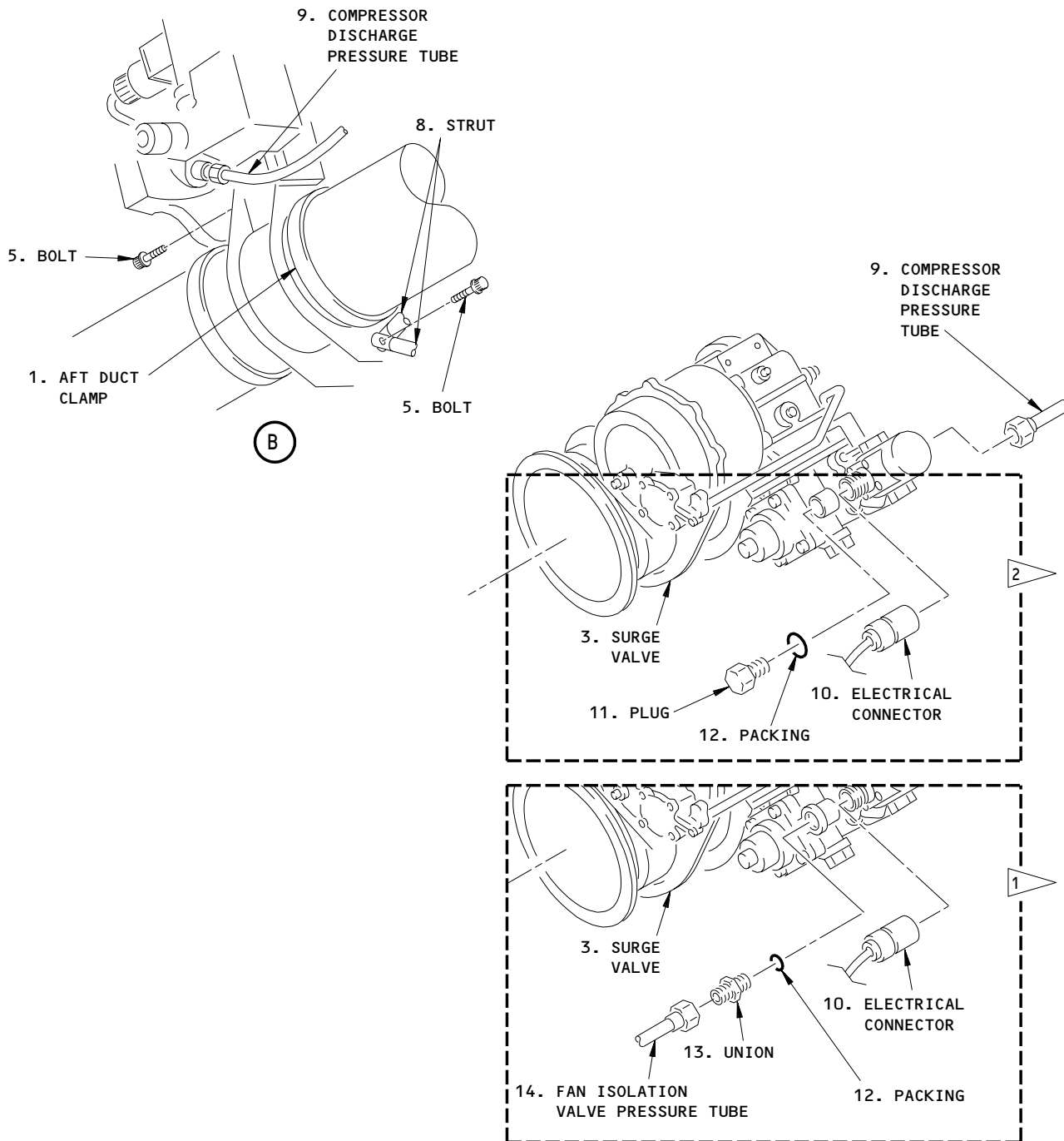
EFFECTIVITY

ALL

49-53-01

01

Page 402  
Apr 22/07



1 APU<sub>s</sub> PRE-HONEYWELL-SB 49-7192;  
MAKE SURE THAT THE FAN ISOLATION VALVE PRESSURE TUBE IS CORRECTLY INSTALLED.

2 APU<sub>s</sub> POST-HONEYWELL-SB 49-7192 OR SB 49-7392;  
MAKE SURE THAT A PLUG WITH PACKING IS CORRECTLY INSTALLED ON THE SURGE CONTROL VALVE IN PLACE OF THE FAN ISOLATION VALVE PRESSURE TUBE.

Surge Control Valve Installation  
Figure 401 (Sheet 2)

EFFECTIVITY

ALL

49-53-01

01

Page 403  
Dec 22/07

2) 49C3, APU START

S 014-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

C. Surge Control Valve Removal

S 024-049

- (1) Disconnect the electrical connector (10) from the surge control valve (3).

(a) Put caps on the electrical connectors.

S 024-050

- (2) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE CONTROL VALVE (PRE-HONEYWELL-SB 49-7192);

Disconnect the pressure tube (14) from the fan isolation valve.

(a) Disconnect the pressure tube (14) for the fan isolation valve from the union (13).

EFFECTIVITY

ALL

49-53-01

03

Page 404  
Apr 22/07



- (b) Remove the union (13) and packing (12) from the surge valve (3).
- (c) Discard the packing (12).
- (d) Put caps on all of the open ends of the tubes and on the surge control valve.

S 024-051

- (3) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR (ALLIEDSIGNAL SB 49-7192);  
Disconnect the pressure tube (9) for the compressor discharge air.
  - (a) Put caps on the open end of the tube and on the surge control valve.

S 024-052

- (4) Remove the coupling (4), the duct clamps (1), and the duct assembly (2).

S 024-053

- (5) If necessary, remove the aft coupling (6) and the elbow duct (7) to help release the surge control valve (3).

S 024-009

- (6) Remove the bolts (5) to remove the surge control valve (3).

TASK 49-53-01-404-010

3. Surge Control Valve Installation (Fig. 401)

A. References

- (1) AMM 49-11-00/201, Auxiliary Power Unit
- (2) AMM 49-61-05/201, APU Control Unit

B. Consumable Materials

- (1) D00408 Lubricant - Graphite Dry Film, DGF 123

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Surge Control Valve	49-53-06	01	50
	11	Plug	49-53-00	01	247
	12	Packing	49-53-00	01	248
	13	Union	49-53-00	01	245

EFFECTIVITY

ALL

49-53-01

02

Page 405  
Apr 22/07

D. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

E. Surge Control Valve Installation

S 024-039

- (1) Remove all of the caps from the tubes and from the surge control valve.

S 424-012

- (2) Attach the surge control valve (3) to the APU with the bolts (5) and the coupling (4).

S 644-037

- (3) Lubricate the ends of the duct assembly (2) with a thin layer of the graphite dry film lubricant.

S 424-040

- (4) Install the duct assembly (2) with the clamps (1).

S 424-041

- (5) If you removed the elbow duct (7) during the surge control valve removal, install the elbow duct (7) with the clamp (6).

S 424-042

- (6) Tighten the coupling (4) and the aft coupling (6):

**NOTE:** Tighten the aft coupling (6) if the elbow duct (7) was removed during the surge control valve removal.

- (a) Tighten the coupling (4) and (6) to 55-60 inch-pounds (6.22-6.78 newton meters).

EFFECTIVITY

ALL

49-53-01

01

Page 406  
Apr 22/07

- (b) Lightly hit all around the couplings (4) and (6) with a rubber hammer to seal the coupling.
- (c) Tighten the couplings (4) and (6) again until the coupling nut stays at the specified torque after you lightly hit it.

S 424-043

- (7) Tighten the bolts (5) to 50-55 inch-pounds (5.65-6.22 newton meters).

S 424-044

- (8) Tighten the clamps (1) to 25-27 inch-pounds (2.83-3.05 newton meters).

S 424-045

- (9) Lubricate the union connections on the surge control valve with a thin layer of the graphite dry film lubricant.

S 424-046

- (10) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE SURGE CONTROL VALVE (PRE-HONEYWELL-SB 49-7192);  
Connect the pressure tube (14) for the fan isolation valve.
  - (a) Lubricate the new packing (12) with a light coat of lubricant.
  - (b) Remove the cap from the pressure tube (14) for the fan isolation valve.
  - (c) Install the union (13) to the pressure tube (14) for the fan isolation valve.
  - (d) Install the packing (12) and the pressure tube (14) for the fan isolation valve to the surge valve (3).

S 424-056

- (11) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR OR WITHOUT THE FAN ISOLATION VALVE (POST-HONEYWELL-SB 49-7192 OR POST-HONEYWELL-SB 49-7392);  
Install a plug (11) and packing (12) on the surge valve (3).
  - (a) Tighten the plug to 65 inch-pounds (7.35 N.m).

EFFECTIVITY

ALL

49-53-01

01

Page 407  
Dec 22/07

S 424-047

- (12) APU WITH THE FAN ISOLATION VALVE CONNECTED TO THE FIRST STAGE COMPRESSOR (ALLIEDSIGNAL SB 49-7192);  
Connect the pressure tube (9) for the compressor discharge air:  
(a) Connect the tube to the surge control valve (3).

S 424-048

- (13) Connect the electrical connector (10) to the surge control valve (3).  
(a) Install a lockwire on the electrical connector.
- F. Put the Airplane Back to its Usual Condition.

S 414-021

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:  
(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.  
(c) Lift the left access door until the two APU access doors are approximately aligned.  
(d) Close the two APU access doors.  
(e) Close the four latches on the right access door.

S 864-022

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:  
(a) P49 APU Auxiliary Panel  
1) 49C2, APU PRIME CONT  
2) 49C3, APU START  
(b) P11 Overhead Panel  
1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-53-01

03

Page 408  
Apr 22/07

- S 864-024
- (3) Remove the DO-NOT-OPERATE tag from the APU control switch.
- S 864-025
- (4) Do this task: APU Starting and Operation (AMM 49-11-00/201).
- S 864-026
- (5) After five minutes, do this task: APU Shutdown Procedure (AMM 49-11-00/201).
- S 744-027
- (6) Do this task: APU Control Unit - BITE Procedure (AMM 49-61-05/201).

EFFECTIVITY

ALL

**49-53-01**

02

Page 409  
Apr 22/07

TOTAL PRESSURE TRANSDUCER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the total pressure transducer
  - (2) An installation of the total pressure transducer.
- B. The total pressure transducer is on the bottom of the APU, forward of the air inlet plenum. You can get access to the transducer through the APU access doors.

TASK 49-53-02-004-001

2. Total Pressure Transducer Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

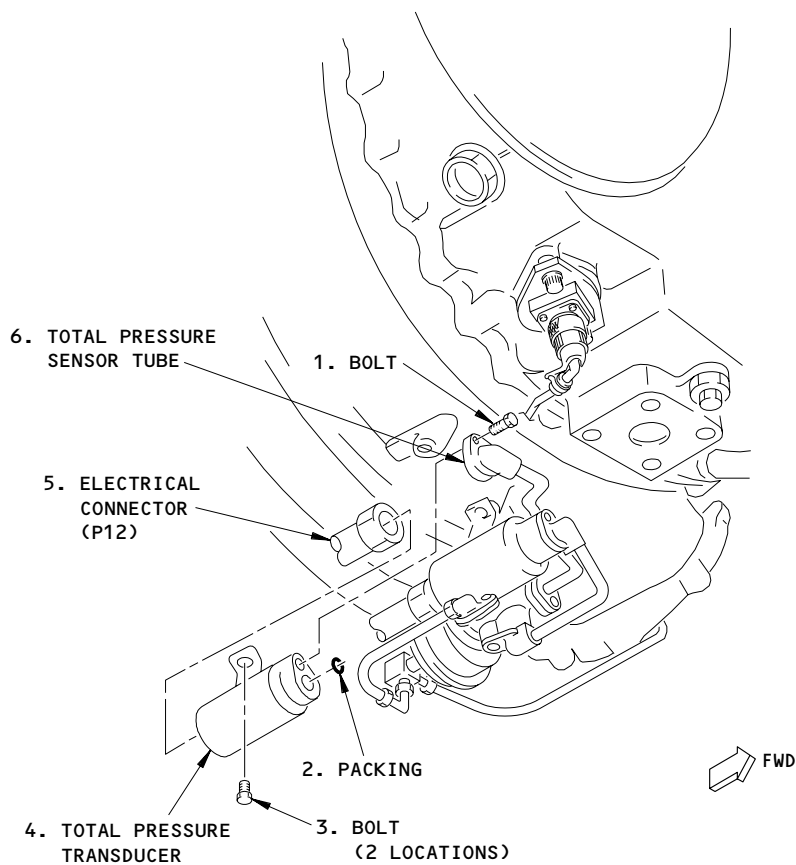
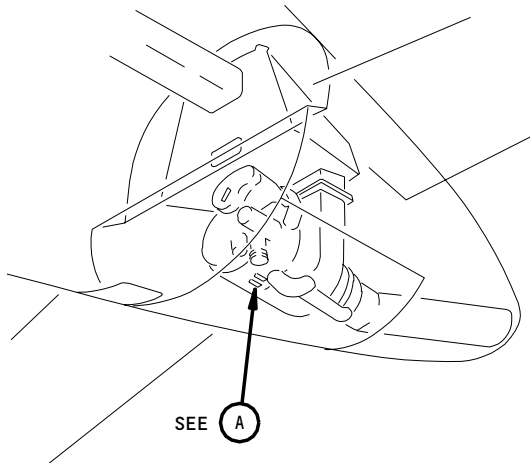
EFFECTIVITY

ALL

49-53-02

01

Page 401  
Aug 22/01



(A)

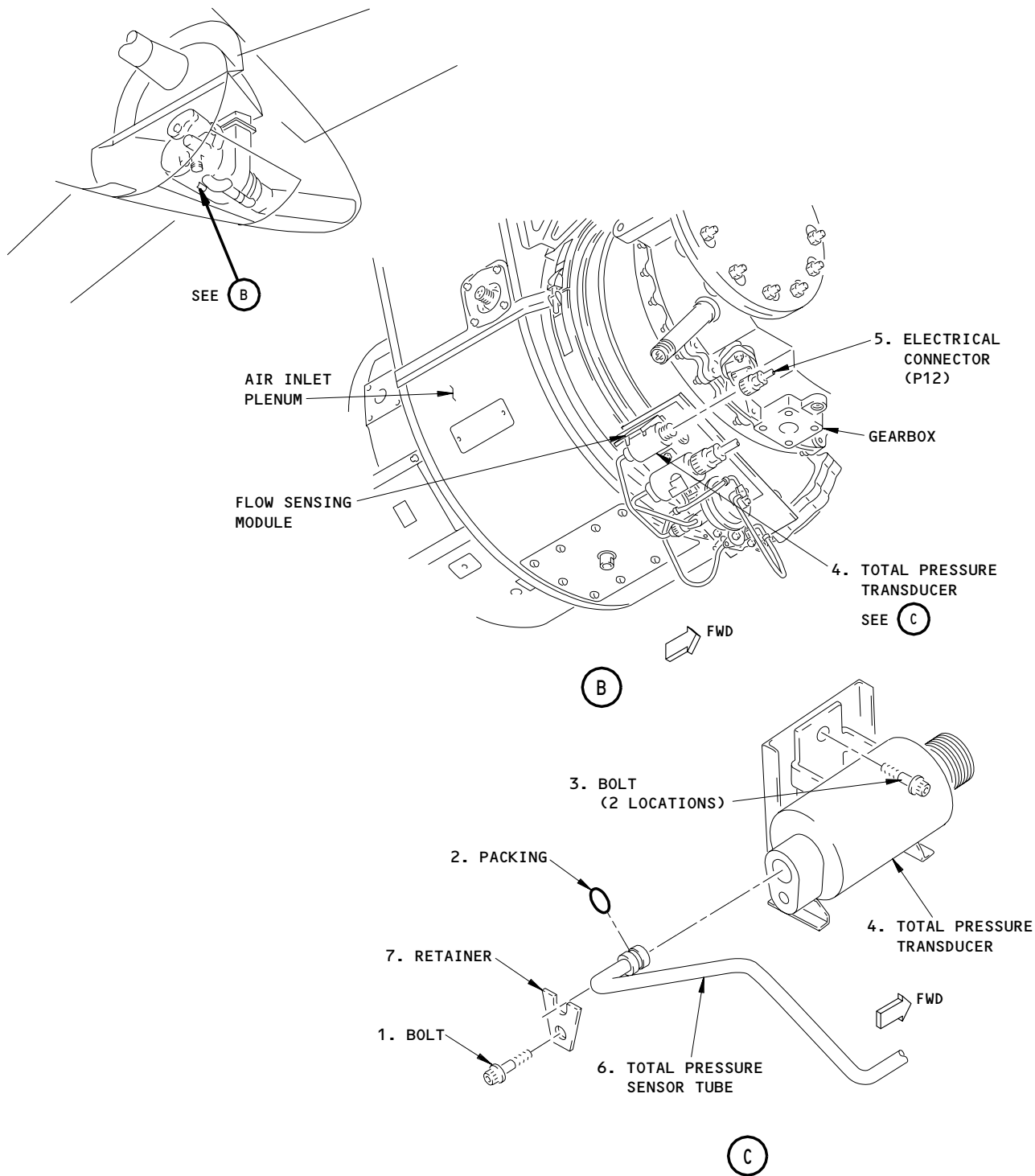
Total Pressure Transducer Installation  
Figure 401 (Sheet 1)

EFFECTIVITY  
AIRPLANES WITHOUT THE FLOW SENSING  
MODULE

49-53-02

01

Page 402  
Aug 22/01



Total Pressure Transducer Installation  
Figure 401 (Sheet 2)

EFFECTIVITY  
AIRPLANES WITH THE FLOW SENSING MODULE

49-53-02



- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

#### C. Total Pressure Sensor Removal

S 024-005

- (1) Do these steps to remove the total pressure transducer (4):
  - (a) Disconnect the P12 electrical connector (5) from the total pressure transducer.
  - (b) AIRPLANES WITHOUT THE FLOW SENSING MODULE;  
Do these steps to remove the total pressure transducer from the APU:
    - 1) Remove the bolt (1) that attaches the total pressure sensor tube (6) to the total pressure transducer (4).
    - 2) Disconnect the total pressure sensor tube (6) from the total pressure transducer (4).

EFFECTIVITY

ALL

49-53-02

03

Page 404  
Aug 22/01

- 3) Remove the two bolts (3) that attach the total pressure transducer (4) to the APU.
  - 4) Remove the total pressure transducer (4).
  - 5) Remove the packing (2) from the total pressure transducer (2).
    - a) Discard the packing (2).
  - 6) Make sure you install all necessary protection covers.
- (c) AIRPLANES WITH THE FLOW SENSING MODULE;  
Do these steps to remove the total pressure transducer (4) from the flow sensing module:
- 1) Remove the bolt (1) and retainer (7) that attach the total pressure sensor tube (6) to the total pressure transducer (4).
  - 2) Disconnect the total pressure sensor tube (6) from the total pressure transducer (4).
  - 3) Remove the two bolts (3) that attach the total pressure transducer (4) to the flow sensing module.
  - 4) Remove the total pressure transducer (4).
  - 5) Remove the packing (2) from the total pressure transducer (4).
    - a) Discard the packing (2).
  - 6) Make sure you install all necessary protection covers.

TASK 49-53-02-404-006

3. Total Pressure Transducer Installation (Fig. 401)

A. References

- (1) AMM 49-61-05/201, APU Control Unit

B. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant, Petrolatum Jelly - VV-P-236

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2 4	Packing Total Pressure Transducer	49-53-00	01	145 70

D. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

EFFECTIVITY

ALL

**49-53-02**

01

Page 405  
Aug 22/05

- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

E. Procedure

S 424-013

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

- (1) Do these steps to install the total pressure transducer (4):
  - (a) AIRPLANES WITHOUT THE FLOW SENSING MODULE;  
Do these steps to install the total pressure transducer (4) to the APU:
    - 1) Lubricate the new packing (2) with a light coat of lubricant.
    - 2) Install the packing (2) on the total pressure transducer (4).
    - 3) Install the total pressure transducer (4) on the APU with the two bolts (3).
      - a) Tighten the bolts (3) to 50-55 inch-pounds (5.7-6.2 newton-meters).
    - 4) Attach the total pressure sensor tube (6) to the total pressure transducer (4) with the bolt (1).
    - 5) Install a lockwire on the pressure line connection.
  - (b) AIRPLANES WITH THE FLOW SENSING MODULE;  
Do these steps to install the total pressure transducer (4) to the flow sensing module:
    - 1) Lubricate the new packing (2) with a light coat of lubricant.
    - 2) Install the packing (2) on the total pressure transducer (4).
    - 3) Install the total pressure transducer (4) on the flow sensing module with the two bolts (3).
      - a) Tighten the bolts (3) to 50-55 inch-pounds (5.7-6.2 newton-meters).
    - 4) Attach the total pressure sensor tube (6) to the total pressure transducer (4) with the retainer (7) and bolt (1).
  - (c) Connect the electrical connector P12 (1) to the total pressure transducer (4).

S 734-008

- (2) Do this task: APU Control Unit - Self-Test (AMM 49-61-05/201).

EFFECTIVITY

ALL

49-53-02

01

Page 406  
Aug 22/05

F. Put the Airplane Back to Its Usual Condition

S 414-009

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 864-010

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 864-011

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-53-02

03

Page 407  
Aug 22/05

TOTAL PRESSURE FLOW SENSOR – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these three tasks:
  - (1) Total Pressure Flow Sensor Removal
  - (2) Total Pressure Flow Sensor Installation
  - (3) Clean the Total Pressure Flow Sensor.
- B. The total pressure flow sensor is referred to as the total pressure sensor during this procedure. This procedure is only for the APUs without the flow sensing module.
- C. The total pressure sensor is on the bottom left side of the APU, forward of the air inlet plenum. You can get access to the sensor through the APU access doors.

TASK 49-53-03-002-001

2. Total Pressure Flow Sensor Removal (Fig. 201)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

B. Procedure

S 862-002

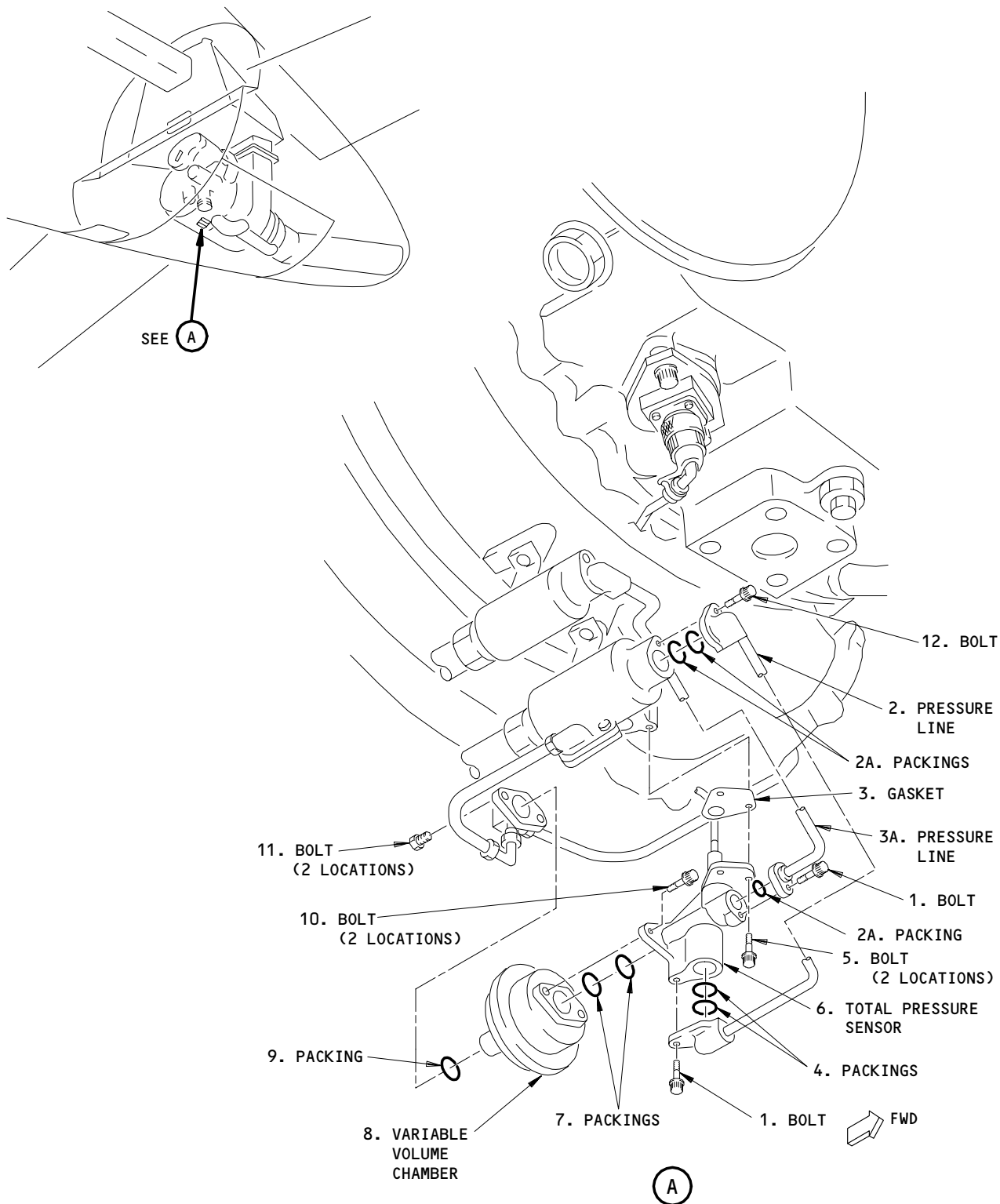
- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

**49-53-03**



Total Pressure Sensor Installation  
Figure 201

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

49-53-03

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 012-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 022-008

CAUTION: BE CAREFUL WHEN YOU REMOVE THE TOTAL PRESSURE SENSOR. DO NOT LET THE SENSOR FALL TO THE GROUND. DO NOT PERMIT A ROUGH MOVEMENT OF THE SENSOR. DAMAGE TO THE SENSOR CAN OCCUR.

- (4) Remove the total pressure sensor:
  - (a) Remove the bolts (1 and 12) that attach the pressure line (2) to the total pressure sensor (6) and the differential pressure transducer.
  - (b) Remove the pressure line (2) and the packings (2A and 4).
    - 1) Discard the packings (2A and 4).
  - (c) Remove the bolt (1) that attaches the pressure line (3A) to the total pressure sensor (6).
    - 1) Discard the packing (2A).
  - (d) Remove the bolts (11) that attach the variable volume chamber to the pressure line.
  - (e) Remove the bolts (5).
  - (f) Remove the total pressure sensor (6) and the variable volume chamber (8) from the APU.
    - 1) Remove and discard the gasket (3) and the packing (9).

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

49-53-03

- (g) Remove the bolts (10) that attach the total pressure sensor (6) to the variable volume chamber (8).
- (h) Remove the total flow sensor (6) and the packings (7) from the variable volume chamber (8).
  - 1) Discard the packings (7).

TASK 49-53-03-402-006

3. Total Pressure Flow Sensor Installation (Fig. 201)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant, Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	2A	Packing	49-53-00	01	140
	3	Gasket			62 or
	4	Packing			145
	6	Flow (Total Pressure) Sensor			58 or
					102 or
					104
	7	Packing			55
	9	Packing			140

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

EFFECTIVITY \_\_\_\_\_  
APU WITHOUT THE FLOW SENSING MODULE

**49-53-03**



S 422-009

**CAUTION:** BE CAREFUL WHEN YOU INSTALL THE TOTAL PRESSURE SENSOR. DO NOT LET THE SENSOR FALL TO THE GROUND. DO NOT PERMIT A ROUGH MOVEMENT OF THE SENSOR. DAMAGE TO THE SENSOR CAN OCCUR.

- (1) Install the total pressure sensor:
  - (a) Lubricate the new packings (7) with a light coat of lubricant.
  - (b) Connect the total pressure sensor (6), with the packings (7), to the variable volume chamber (8) with the bolts (10).
    - 1) Tighten the bolts (10) to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (c) Install the total pressure sensor (6), with the new gasket (3), to the APU with the bolts (5).
    - 1) Tighten the bolts (5) to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (d) Lubricate the new packing (9) with a light coat of lubricant.
  - (e) Install the packing (9) on the variable volume chamber (8).
  - (f) Attach the variable volume chamber (8) to the pressure line with the bolts (11).
  - (g) Lubricate the new packing (2A) with a light coat of lubricant.
  - (h) Connect the pressure line (3A), with the packing (2A), to the total pressure sensor (6) with the bolt (1).
    - 1) Tighten the bolt (1) to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (i) Lubricate the new packings (2A and 4) with a light coat of lubricant.
  - (j) Connect the pressure line (2), with the packings (2A and 4), to the total pressure sensor (6) and the transducer with the bolts (1 and 12).
    - 1) Tighten the bolts (1 and 12) to 50-55 inch-pounds (5.7-6.2 newton-meters).

S 412-010

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

49-53-03

01

Page 205  
Aug 22/01

S 862-011

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 862-012

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-53-03-102-013

4. Clean the Total Pressure Flow Sensor

A. Standard Tools and Equipment

- (1) Compressed Air Source - 30 psig maximum

B. Consumable Materials

- (1) B00074 Solvent - Degreasing, MIL-PRF-680 Type I (Supersedes P-D-680)

- (2) G01043 Cloth - Lintfree

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 012-014

- (1) Remove the total pressure sensor (Ref par. 2).

S 112-015

- (2) Clean the total pressure sensor:

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

49-53-03

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME, AND HEAT. THE SOLVENT IS POISONOUS AND FLAMMABLE AND CAN CAUSE INJURY TO PERSONS AND DAMAGE TO EQUIPMENT.

- (a) Fully clean the total pressure sensor with the lintfree cloth made moist with the solvent.
- (b) Dry the total pressure sensor with the compressed air.

S 412-016

- (3) Install the total pressure sensor (Ref par. 3).

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

**49-53-03**

01

Page 207  
Apr 22/00

DIFFERENTIAL PRESSURE TRANSDUCER - REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the differential pressure transducer
  - (2) An installation of the differential pressure transducer.
- B. The differential pressure transducer is on the bottom left side of the APU, forward of the air inlet plenum. You can get access to the transducer through the APU access doors.

TASK 49-53-04-004-001

2. Differential Pressure Transducer Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

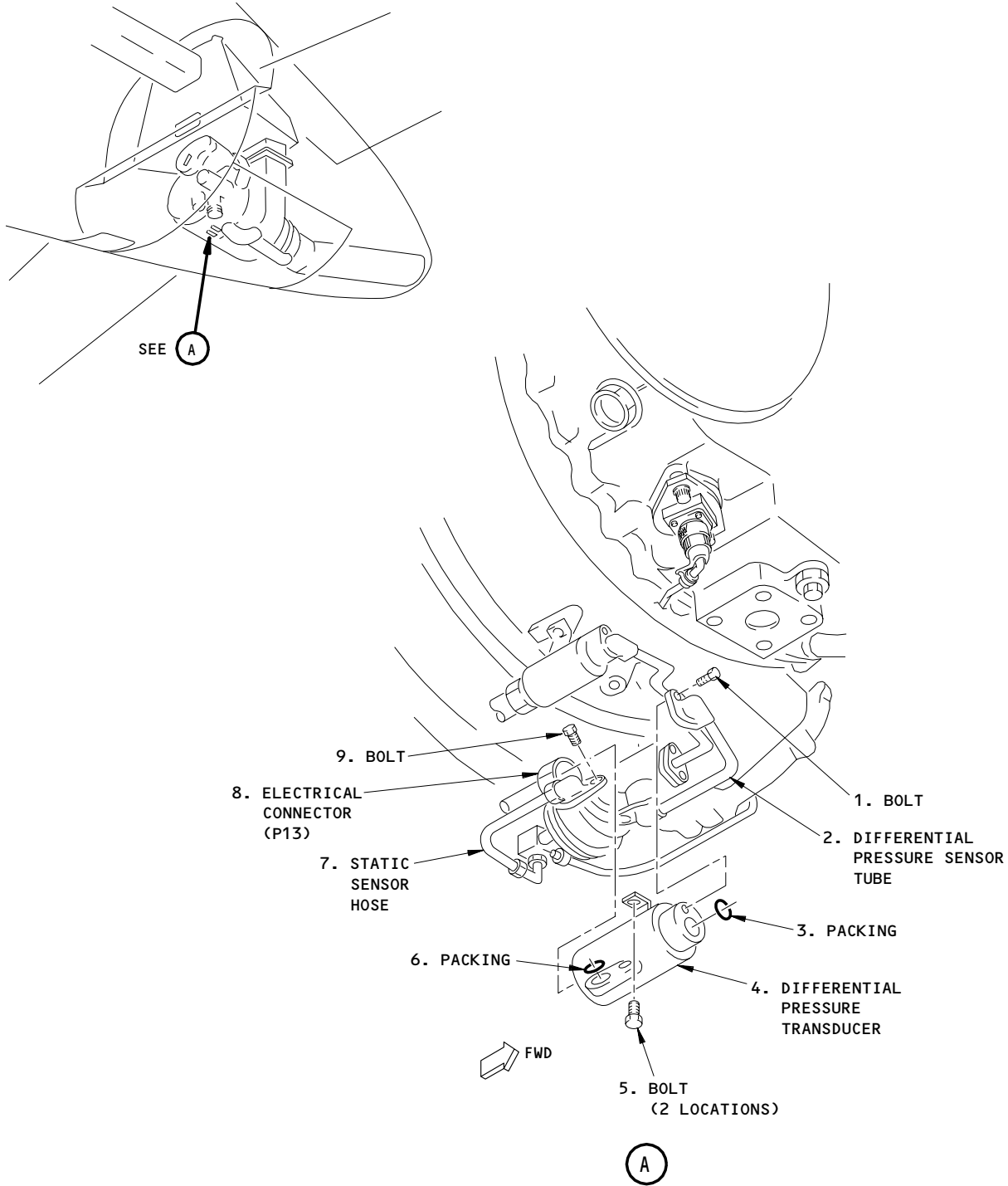
EFFECTIVITY

ALL

49-53-04

04

Page 401  
Aug 22/01



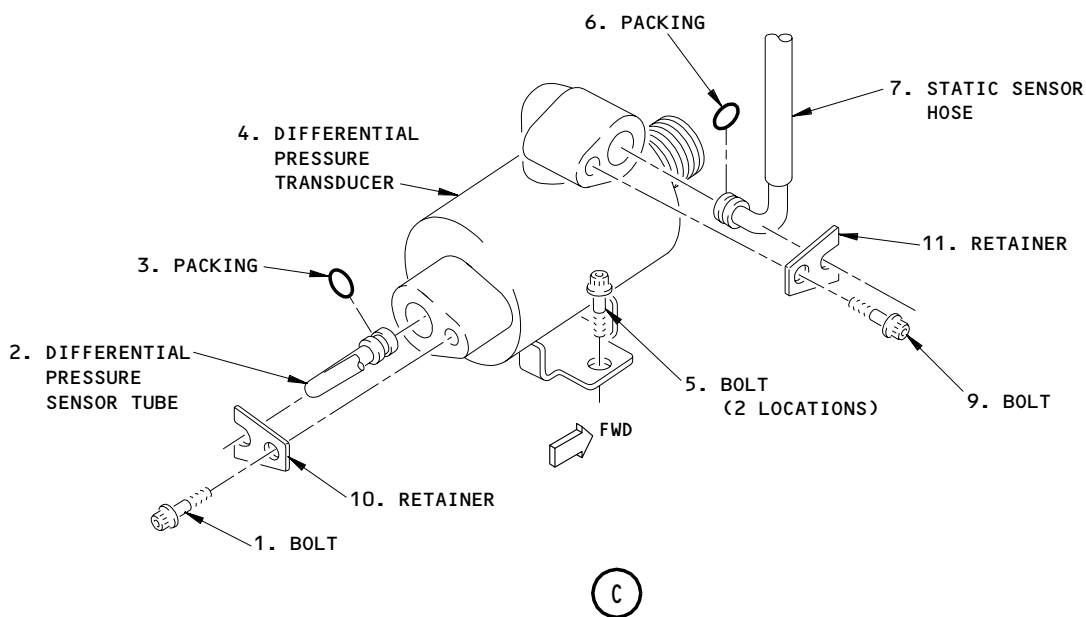
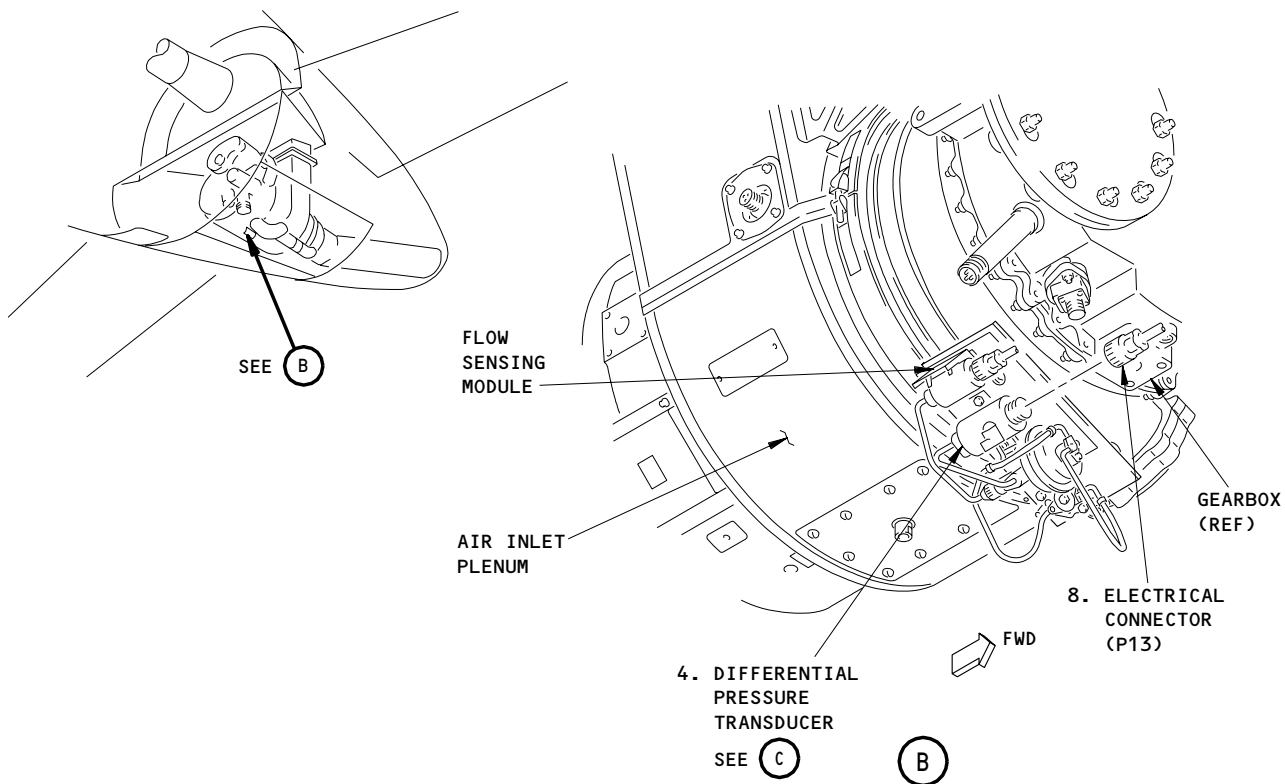
Differential Pressure Transducer Installation  
Figure 401 (Sheet 1)

EFFECTIVITY  
AIRPLANES WITHOUT THE FLOW SENSING  
MODULE

49-53-04

01

Page 402  
Aug 22/01



Differential Pressure Transducer Installation  
Figure 401 (Sheet 2)

EFFECTIVITY  
AIRPLANES WITH THE FLOW SENSING MODULE

49-53-04

2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

C. Differential Pressure Transducer Removal

S 024-012

CAUTION: BE CAREFUL DURING THE REMOVAL OF THE TRANSDUCER. DO NOT LET THE TRANSDUCER FALL TO THE GROUND. DO NOT CAUSE A ROUGH MOVEMENT OF THE TRANSDUCER. DAMAGE TO THE TRANSDUCER CAN OCCUR.

- (1) Do these steps to remove the differential pressure transducer (4):

(a) Disconnect the P13 electrical connector (8) from the differential pressure transducer (4).

(b) AIRPLANES WITHOUT THE FLOW SENSING MODULE;

Do these steps to remove the differential pressure transducer from the APU:

1) Remove the bolt (1) that attaches the differential pressure sensor tube (2) to the differential pressure transducer (4).

EFFECTIVITY

ALL

49-53-04

03

Page 404  
Dec 22/07

- 2) Disconnect the differential pressure sensor tube (2) from the differential pressure transducer (4).
  - 3) Remove the bolt (9) that attaches the static sensor hose (7) to the differential pressure transducer (4).
  - 4) Disconnect the static sensor hose (7) from the differential pressure sensor tube (2).
  - 5) Remove the two bolts (5) that attach the differential pressure transducer (4) to the APU.
  - 6) Remove the differential pressure transducer (4).
  - 7) Remove the two packings (3), (6) from the differential pressure transducer (4).
    - a) Discard the two packings (3), (6).
  - 8) Make sure you install all necessary protection covers.
- (c) AIRPLANES WITH THE FLOW SENSING MODULE;  
Do these steps to remove the differential pressure transducer (4) from the flow sensing module:
- 1) Remove the bolt (1) and retainer (10) that attach the differential pressure sensor tube (2) to the differential pressure transducer (4).
  - 2) Disconnect the differential pressure sensor tube (2) from the differential pressure transducer (4).
  - 3) Remove the bolt (9) and retainer (11) that attach the static sensor hose (7) to the differential pressure transducer (4).
  - 4) Disconnect the static sensor hose (7) from the differential pressure sensor tube (2).
  - 5) Remove the two bolts (5) that attach the differential pressure transducer (4) to the flow sensing module.
  - 6) Remove the differential pressure transducer (4).
  - 7) Remove the two packings (3), (6) from the differential pressure transducer (4).
    - a) Discard the two packings (3), (6).
  - 8) Make sure you install all necessary protection covers.

TASK 49-53-04-404-006

3. Differential Pressure Transducer Installation (Fig. 401)

A. References

- (1) AMM 49-61-05/201, APU Control Unit

EFFECTIVITY

ALL

49-53-04

01

Page 405  
Aug 22/01



B. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant, Petrolatum Jelly - VV-P-236

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Packing	49-53-00	01	140
	4	Differential Pressure Transducer			65 or
	6	Packing			107 140

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-013

**CAUTION:** BE CAREFUL DURING THE DIFFERENTIAL PRESSURE TRANSDUCER INSTALLATION. DO NOT LET THE DIFFERENTIAL PRESSURE TRANSDUCER FALL TO THE GROUND. DO NOT CAUSE A ROUGH MOVEMENT OF THE DIFFERENTIAL PRESSURE TRANSDUCER. DAMAGE TO DIFFERENTIAL PRESSURE TRANSDUCER CAN OCCUR.

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

- (1) Do these steps to install the differential pressure transducer (4):
  - (a) AIRPLANES WITHOUT THE FLOW SENSING MODULE;  
Do these steps to install the differential pressure transducer (4) to the APU:
    - 1) Lubricate the two new packings (3), (6) with a light coat of lubricant.

EFFECTIVITY

ALL

49-53-04

01

Page 406  
Aug 22/05

- 2) Install the two packings (3), (6) on the differential pressure transducer (4).
  - 3) Install the differential pressure transducer (4) on the APU with the two bolts (5).
    - a) Tighten the bolts to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - 4) Attach the static sensor hose (7) to the differential pressure transducer (4) with the bolt (9).
  - 5) Attach the differential pressure sensor tube (2) to the differential pressure transducer (4) with the bolt (1).
- (b) AIRPLANES WITH THE FLOW SENSING MODULE;  
Do these steps to install the differential pressure transducer (4) on the flow sensing module:
- 1) Lubricate the two new packings (3), (6) with a light coat of lubricant.
  - 2) Install the two packings (3), (6) on the differential pressure transducer (4).
  - 3) Install the differential pressure transducer (4) on the APU with the two bolts (5).
    - a) Tighten the bolts to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - 4) Attach the static sensor hose (7) to the differential pressure transducer (4) with the bolt (9) and retainer (11).
  - 5) Attach the differential pressure sensor tube (2) to the differential pressure transducer (4) with the bolt (1) and retainer (10).
- (c) Connect the electrical connector P13 (8) to the differential pressure transducer (4).

S 864-021

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

EFFECTIVITY

ALL

49-53-04

03

Page 407  
Aug 22/01

- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-020

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 734-008

- (4) Do the self-test for the APU system (AMM 49-61-05/201).

F. Put the Airplane Back to Its Usual Condition

S 414-009

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-53-04

02

Page 408  
Aug 22/05

STATIC PRESSURE SENSOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the static pressure sensor. This procedure is only for the APUs without the flow sensing module.
- B. The static pressure sensor is on the left bottom side of the APU, forward of the air inlet plenum. The sensor is installed between the T-duct and the APU.
- C. You can get access to the static pressure sensor through the APU access doors.

TASK 49-53-05-004-001

2. Static Pressure Sensor Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

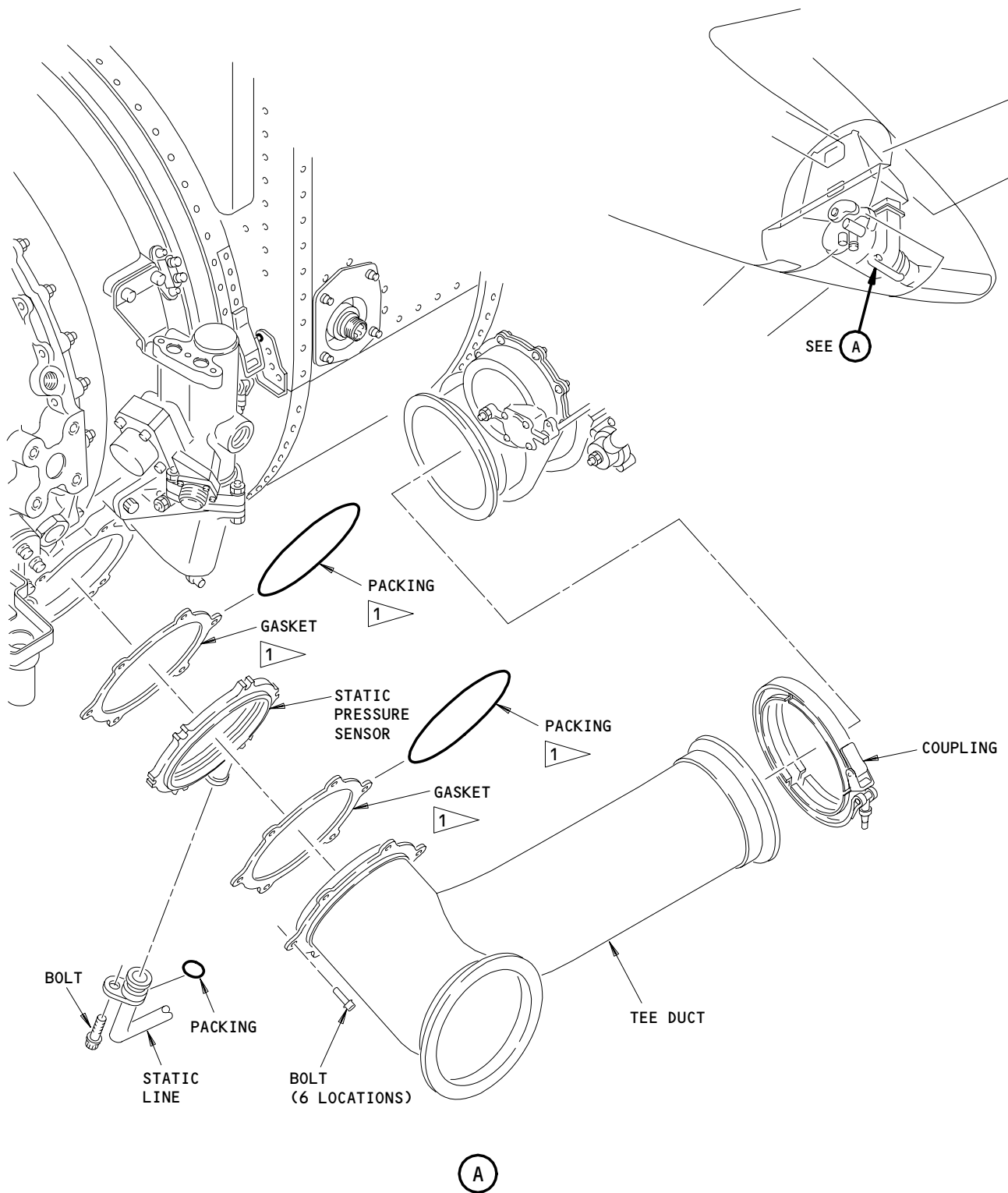
- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

49-53-05



1 USE THE PACKINGS ON THE SENSORS WITH THE GROOVES IN THE MOUNTING FLANGE.  
USE THE GASKETS ON THE SENSORS WITHOUT THE GROOVES

Static Pressure Sensor Installation  
Figure 401

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

49-53-05

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the static pressure sensor:

- (a) Remove the bolt that attaches the static line to the static pressure sensor.

CAUTION: MAKE SURE YOU HOLD THE BOSS WHILE YOU DISCONNECT THE STATIC LINE FROM THE SENSOR. DAMAGE TO THE BOSS CAN OCCUR.

- (b) While you hold the boss on the static pressure sensor, disconnect the static line from the sensor.
- (c) Remove and discard the packing from the static line.
- (d) Remove the coupling that attaches the T-duct to the APU surge valve.
- (e) Remove the six bolts that attach the T-duct to the APU.

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

49-53-05

- (f) Remove the T-duct, the gaskets or the packings, and the static pressure sensor from the APU.

**NOTE:** The packings are used on the sensors with the grooves in the mounting flange. The gaskets are used on the sensors without the grooves.

- 1) Discard the gaskets or the packings.

TASK 49-53-05-404-006

3. Static Pressure Sensor Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or  
(2) D00504 Lubricant, Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Gasket Packing Static Pressure Sensor  Packing (TBD)	49-53-00	01	44 45 47 or 48J

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

D. Procedure

S 424-007

- (1) Install the static pressure sensor:  
(a) Lubricate the new packings with a light coat of lubricant.

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

49-53-05

- (b) Install the new gaskets or the packings on the static pressure sensor.

NOTE: The packings are used on the sensors with the grooves in the mounting flange. The gaskets are used on the sensors without the grooves.

- (c) Attach the static pressure sensor and the T-duct to the APU with the six bolts.
  - 1) Do not tighten the bolts at this time.
- (d) Install the coupling that attaches the T-duct to the APU surge valve.

CAUTION: DO NOT TIGHTEN THE COUPLING TOO TIGHT. DAMAGE TO THE DUCT OR THE VALVE MOUNTING SURFACE CAN OCCUR.

- 1) Tighten the coupling to 55–60 inch-pounds (6.2–6.8 newton-meters).
- 2) Make sure the coupling is correctly installed on the T-duct and the surge valve.
- 3) Tighten the coupling to specified torque again if it is necessary.
- (e) Tighten the six mounting bolts to 50–55 inch-pounds (5.7–6.2 newton-meters).
- (f) Lubricate the new packing with a light coat of lubricant.
- (g) Install the packing on the static line.

CAUTION: MAKE SURE YOU HOLD THE BOSS WHILE YOU CONNECT THE STATIC LINE TO THE SENSOR. DAMAGE TO THE BOSS CAN OCCUR.

- (h) While you hold the boss, connect the static line to the static pressure sensor.
- (i) Install the bolt that attaches the static line to the static pressure sensor.

S 414-008

- (2) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY \_\_\_\_\_  
APU WITHOUT THE FLOW SENSING MODULE

**49-53-05**



S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU PRIME CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY  
APU WITHOUT THE FLOW SENSING MODULE

49-53-05

02

Page 406  
Aug 22/05

SURGE VALVE FILTER ELEMENT – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these four tasks:
  - (1) Surge Valve Filter Element Removal
  - (2) Surge Valve Filter Element Installation
  - (3) Surge Valve Filter Element Check
  - (4) Clean the Surge Valve Filter Element.
- B. The filter element for the surge valve is in a housing below the torque motor for the surge valve. You can get access to the filter element through the APU access doors.

TASK 49-53-06-002-001

2. Surge Valve Filter Element Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel is Off and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

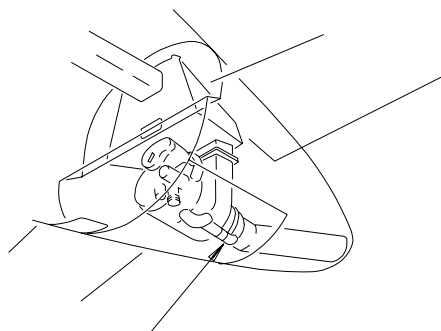
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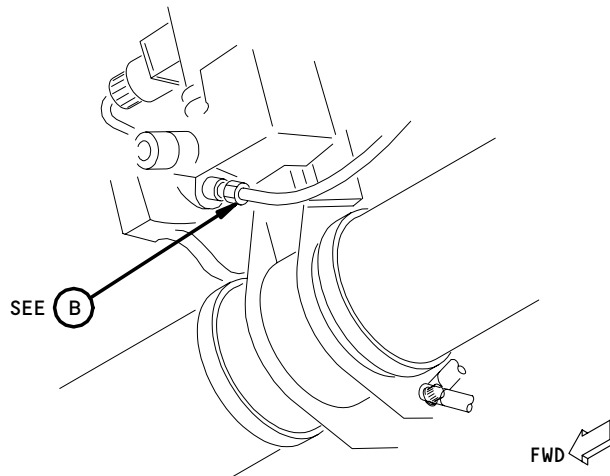
49-53-06

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Page 201  
Aug 22/01

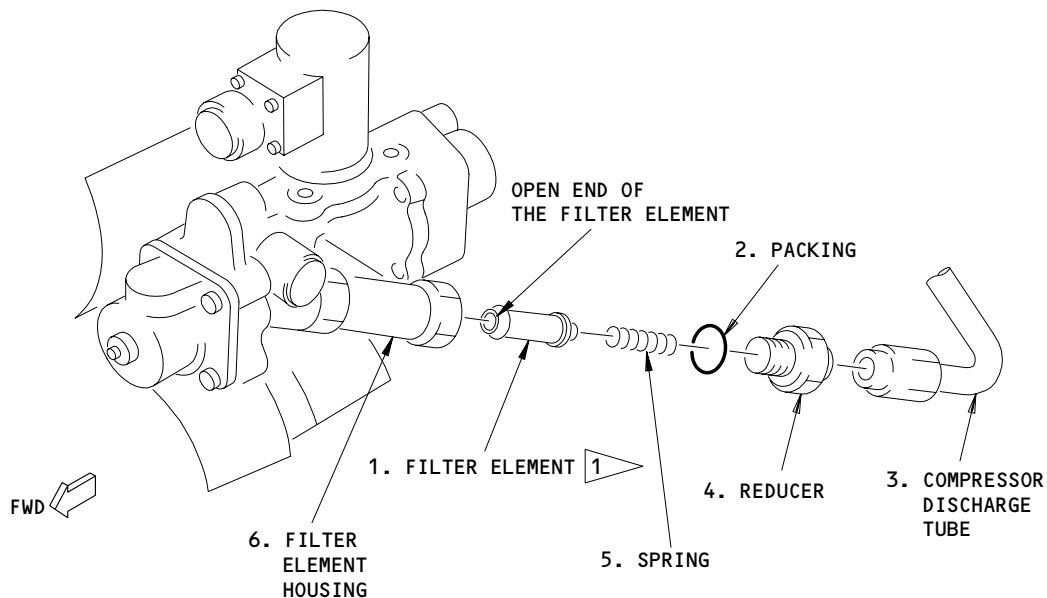


BOTTOM OF SURGE VALVE  
SEE (A)



BOTTOM OF SURGE VALVE

(A)



(B)

1 SURGE VALVES WITH A SMALL FILTER ELEMENT HOUSING MUST USE A SMALL FILTER ELEMENT. SURGE VALVES WITH A LARGE FILTER ELEMENT HOUSING MUST USE A LARGE FILTER ELEMENT.

Surge Valve Filter Element Installation  
Figure 201

EFFECTIVITY

ALL

49-53-06

01

Page 202  
Nov 10/94

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 012-005

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 022-028

- (4) Remove the filter element for the surge valve:
  - (a) Disconnect the compressor discharge tube (3) from the reducer (4).
  - (b) Remove the reducer (4) and the packing (2) from the filter element housing (6).
    - 1) Discard the packing (2).
  - (c) Remove the spring (5) and the filter element (1) from the filter element housing (6).

TASK 49-53-06-402-009

3. Surge Valve Filter Element Installation (Fig. 201)

A. Consumable Materials

- (1) D00006 Compound - Pure Nickel Special - Never Seez NSBT-8N (Recommended)

EFFECTIVITY

ALL

49-53-06

03

Page 203  
Aug 22/01

**BOEING**  
767  
MAINTENANCE MANUAL

(2) D00667 Compound, High Temperature - Fel-Pro C5

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	Filter Element	49-53-06	01	75
	2	Packing			65

C. References

(1) AMM 49-11-00/201, Auxiliary Power Unit

D. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right  
315 APU Compartment - Left  
316 APU Compartment - Right

(2) Access Panels

315AL APU Access Door - Left  
316AR APU Access Door - Right  
822 Aft Cargo Door

E. Procedure

S 422-029

(1) Install the filter element for the surge control valve:

(a) Lubricate the threads on the filter housing (6) and the reducer (4) with the antiseize compound.

**CAUTION:** MAKE SURE YOU INSTALL THE OPEN END OF THE FILTER ELEMENT INTO THE HOUSING BEFORE YOU INSTALL THE SPRING. THE SPRING MUST TOUCH THE REDUCER WHEN THE FILTER ASSEMBLY IS INSTALLED. IF YOU DO NOT INSTALL THE FILTER CORRECTLY, A BLOCKAGE CAN OCCUR THAT CAN PREVENT SURGE VALVE OPERATION.

(b) Install the filter element (1), the spring (5), a new packing (2), and the reducer (4) in the filter element housing (6).

1) Make sure the open end of the filter (1) element goes into the filter element housing (6).  
2) Tighten the reducer (4) to 100-120 inch-pounds (11.3-13.5 newton-meters).

(c) Connect the compressor discharge tube (3) to the reducer (4).

EFFECTIVITY

ALL

49-53-06

02

Page 204  
Aug 22/05

S 862-013

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 862-015

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 792-016

- (4) Do a leakage check of the filter element installation:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) Operate the APU with a pneumatic load (AMM 36-00-00/201).
  - (c) Make sure the duct pressure increases.
  - (d) During the APU operation, examine the filter housing for air leakage.
  - (e) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (f) If the duct pressure did not increase, check the filter element for correct installation.
  - (g) If you found air leakage, repair the cause of it.

S 412-019

- (5) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

TASK 49-53-06-702-020

4. Surge Valve Filter Element Test (Fig. 202)

A. Standard Tools and Equipment

- (1) Regulator - Air Pressure, 0-30 psig
- (2) Gage - Air Pressure, 0-30 psig (two are necessary)
- (3) Restrictor - 0.042 inch diameter orifice

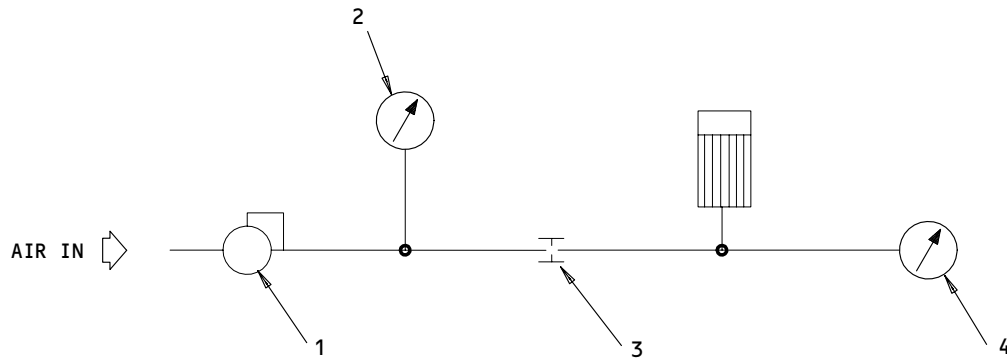
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ALL

49-53-06

03

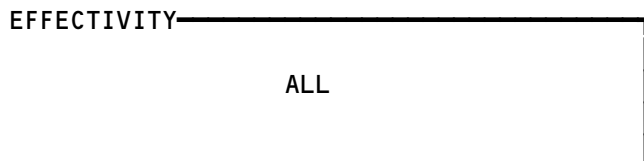
Page 205  
Aug 22/01



- 1. AIR PRESSURE REGULATOR  
(0 TO 30 PSIG)
- 2. INLET PRESSURE GAGE  
(0 TO 30 PSIG)

- 3. RESTRICTOR UNIT  
(0.042 INCH DIAMETER ORIFICE)
- 4. DOWNSTREAM PRESSURE  
GAGE (0 TO 30 PSIG)

Filter Element Pressure Drop Check  
Figure 202



**49-53-06**

01

Page 206  
Aug 10/91

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 012-030

- (1) If it is installed, remove the filter element for the surge valve (Ref par. 2).

S 782-031

- (2) Do the pressure test for the filter element:
- (a) Install the filter element in test equipment as shown in Fig. 202.
  - (b) Adjust the pressure regulator (1) to supply air at a pressure of 20 psig as shown on the pressure gage (2).
  - (c) Look at the pressure on the pressure gage (4).
  - (d) If the pressure difference between the pressure gages (2 and 4) is more than 3.5 psig, clean the filter element (Ref par. 5).

S 412-032

- (3) Install the filter element for the surge valve (Ref par. 3).

TASK 49-53-06-102-025

5. Clean the Surge Valve Filter Element

A. Standard Tools and Equipment

- (1) Compressed Air Source - 30 psig maximum

B. Consumable Materials

- (1) E00116 Rust Stripper - Oakite
- (2) G02158 Brush

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

EFFECTIVITY

ALL

49-53-06

01

Page 207  
Aug 22/01



- (2) Access Panels
  - 315AL APU Access Door - Left
  - 316AR APU Access Door - Right
  - 822 Aft Cargo Door

D. Procedure

S 012-033

- (1) If it is installed, remove the filter element for the surge valve (Ref par. 2).

S 842-026

- (2) Prepare the solution to clean the filter element:

**WARNING:** USE A RESPIRATOR WHEN YOU MIX THE SOLUTION TO CLEAN THE FILTER ELEMENT. SLOWLY ADD THE RUST STRIPPER WHILE YOU MIX THE SOLUTION. WHEN YOU MIX THE SOLUTION, THE SOLUTION TEMPERATURE CAN BE MORE THAN THE BOILING POINT AND CAN CAUSE AN INJURY.

- (a) Mix 3-5 pounds (1.36-2.26 kilograms) of the rust stripper to each gallon of water.
- (b) Keep the solution at 71-93°C (160-200°F).
- (c) Use the compressed air to keep the solution mixed.

S 112-027

**WARNING:** CLEAN THE FILTER IN A CLEAN AREA WITH A GOOD AIR FLOW. USE RUBBER GLOVES AND PROTECTIVE CLOTHING. MAKE SURE THERE ARE FIRE EXTINGUISHERS THAT ARE NEAR. THE SOLUTION IS FLAMMABLE AND CAN CAUSE AN INJURY.

- (3) Clean the filter element:
  - (a) Soak the filter element in the solution for 5 minutes.
  - (b) Remove the filter element from the solution.
  - (c) Use a brush to remove the scales that stayed on the filter.
  - (d) Flush the filter element with a warm solution of soap and water.
  - (e) Flush the filter element with clean water.
  - (f) Dry the filter element with the compressed air.
  - (g) If you do not install the clean filter element immediately, put the filter in a clean, dry container.

S 412-034

- (4) Install the filter element for the surge valve (Ref par. 3).

EFFECTIVITY

ALL

49-53-06

01

Page 208  
Aug 22/01

VARIABLE VOLUME CHAMBER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the variable volume chamber
  - (2) An installation of the variable volume chamber.
- B. The variable volume chamber is on the bottom of the APU, forward of the air inlet plenum. You can get access to the chamber through the APU access doors.

TASK 49-53-07-004-001

2. Variable Volume Chamber Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Prepare for the Removal

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

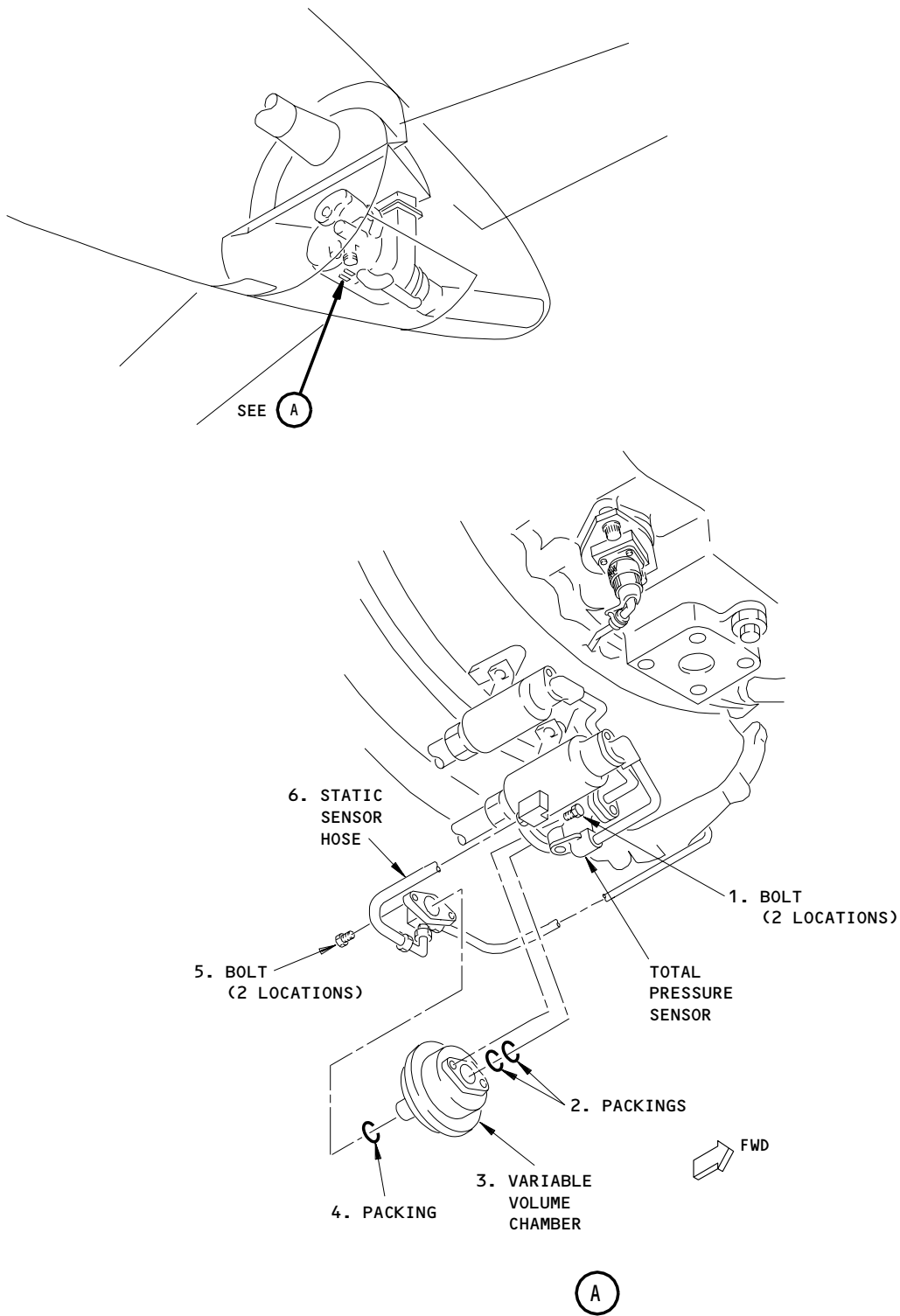
EFFECTIVITY

ALL

49-53-07

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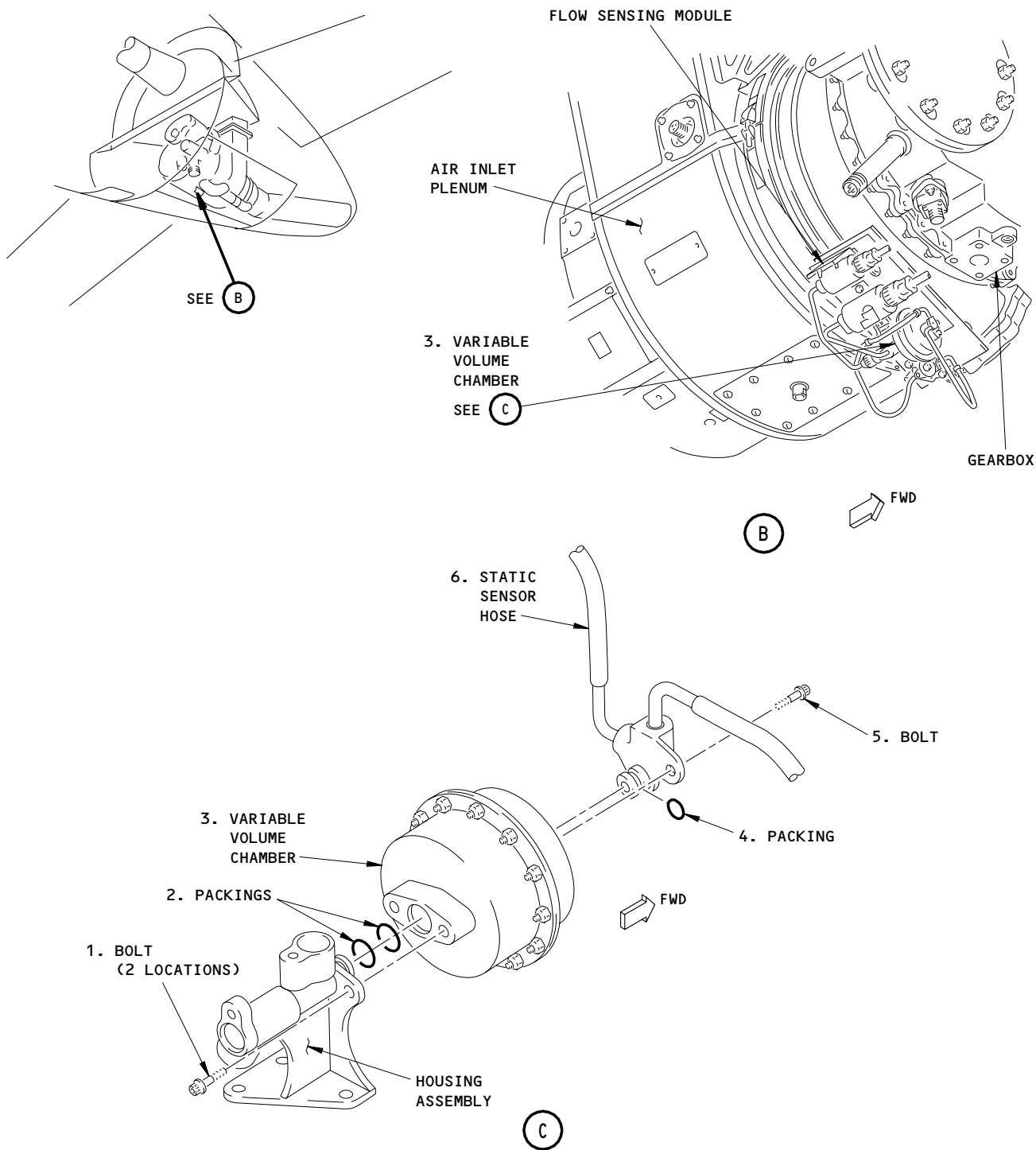
Page 401  
Aug 22/01



Variable Volume Chamber Installation  
Figure 401 (Sheet 1)

EFFECTIVITY  
AIRPLANES WITHOUT THE FLOW SENSING  
MODULE

49-53-07



Variable Volume Chamber Installation  
Figure 401 (Sheet 2)

EFFECTIVITY  
AIRPLANES WITH THE FLOW SENSING MODULE

49-53-07

01

Page 403  
Aug 22/01

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

#### C. Variable Volume Chamber Removal

S 024-005

- (1) Do these steps to remove the variable volume chamber (3):
  - (a) Remove the two bolts (5) that attach the static sensor hose (6) to the variable volume chamber (3).
  - (b) Disconnect the static sensor hose (6) from the variable volume chamber (3).

EFFECTIVITY

ALL

49-53-07

03

Page 404  
Aug 22/01

- (c) AIRPLANES WITHOUT THE FLOW SENSING MODULE;  
Remove the two bolts (1) that attach the variable volume chamber (3) to the total pressure sensor.
- (d) AIRPLANES WITH THE FLOW SENSING MODULE;  
Remove the two bolts (1) that attach the variable volume chamber (3) to the housing assembly.
- (e) Remove the variable volume chamber (3).
- (f) Remove the three packings (2), (4) from the variable volume chamber (3).  
1) Discard the three packings (2), (4).
- (g) Make sure you install all necessary protection covers.

TASK 49-53-07-404-006

3. Variable Volume Chamber Installation (Fig. 401)

A. Consumable Materials

- (1) D00341 Lubricant - Santovac 5 or
- (2) D00504 Lubricant, Petrolatum Jelly - VV-P-236

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Packing	49-53-00	01	55
	3	Variable Volume Chamber			50
	4	Packing			140

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

EFFECTIVITY

ALL

**49-53-07**

01

Page 405  
Aug 22/05

S 424-012

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

- (1) Do these steps to install the variable volume chamber (3):
  - (a) Lubricate the three new packings (2), (4) with a light coat of lubricant.
  - (b) Install the three packings (2), (4) on the variable volume chamber (3).
  - (c) AIRPLANES WITHOUT THE FLOW SENSING MODULE;  
Install the variable volume chamber (3) to the total pressure sensor with the two bolts (1).
    - 1) Tighten the two bolts (1) to 50-53 inch-pounds (5.7-6.0 newton-meters).
  - (d) AIRPLANES WITH THE FLOW SENSING MODULE;  
Install the variable volume chamber (3) to the housing assembly with the two bolts (1).
    - 1) Tighten the two bolts (1) to 50-53 inch-pounds (5.7-6.0 newton-meters).
  - (e) Attach the static sensor hose (6) to the variable volume chamber (3) with the two bolts (5).

E. Put the Airplane Back to Its Usual Condition

S 414-008

- (1) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
  - (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
  - (c) Lift the left access door until the two APU access doors are approximately aligned.
  - (d) Close the two APU access doors.
  - (e) Close the four latches on the right access door.

S 864-009

- (2) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-53-07

03

Page 406  
Aug 22/05

 **BOEING**  
767  
MAINTENANCE MANUAL

- 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-010

- (3) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

**49-53-07**

02

Page 407  
Aug 22/01



FLOW SENSING MODULE – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the flow sensing module for the APU surge system. The module contains most of the components that are necessary for the surge bleed system on the APU.
- B. APU POST-ALLIEDSIGNAL-SB 49-5840;  
installs the flow sensing module on the APUs that are in service without the module.
- C. When you replace the flow sensing module, all of these surge system components are replaced:
  - (1) APU WITH THE FLOW SENSING MODULE (PRE-HONEYWELL-SB 49-7711);  
The total pressure sensor
  - (2) The total pressure transducer
  - (3) The differential pressure transducer
  - (4) The variable volume chamber
  - (5) APU WITH THE FLOW SENSING MODULE (PRE-HONEYWELL-SB 49-7711);  
The static pressure sensor.
- D. APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711);  
The flow sensor (total pressure probe and static pressure sensor) is not attached to the flow sensing module. The static pressure sensor is adjustable under APU test cell conditions. The flow sensor must not be removed or replaced while the APU is installed on the airplane. You must replace the defective flow sensor in the APU test cell since an adjustment test of the flow sensor is necessary. The flow sensing module contains the total pressure transducer, differential pressure transducer and variable volume chamber. You must install the flow sensor first before you can install the flow sensing module.
- E. The flow sensing module is on the bottom of the APU between the gearbox and the air inlet plenum. You can get access to the module through the APU access doors.

TASK 49-53-08-004-001

2. Flow Sensing Module Removal (Fig. 401)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

EFFECTIVITY \_\_\_\_\_  
 APU WITH THE FLOW SENSING MODULE

**49-53-08**

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
- (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

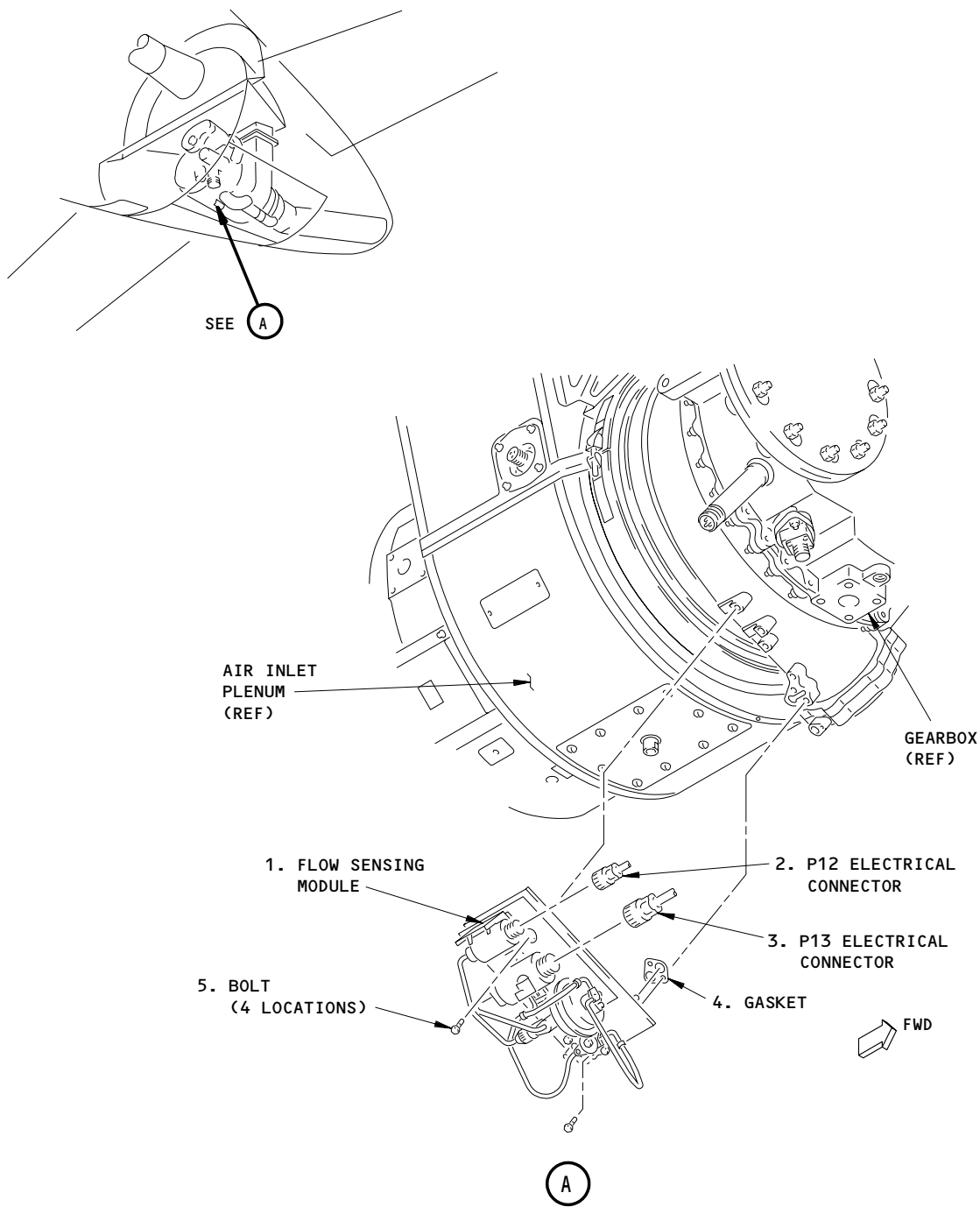
- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-050

- (4) APU WITH THE FLOW SENSING MODULE (PRE-HONEYWELL-SB 49-7711); Do these steps to remove the flow sensing module (1):
- (a) Disconnect the P12 electrical connector (2) and the P13 electrical connector (3) from the flow sensing module (1).
    - 1) Install caps on the electrical connectors (2 and 3) and the module components for protection.
  - (b) Remove the four bolts (5) that attach the flow sensing module to the APU.

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE

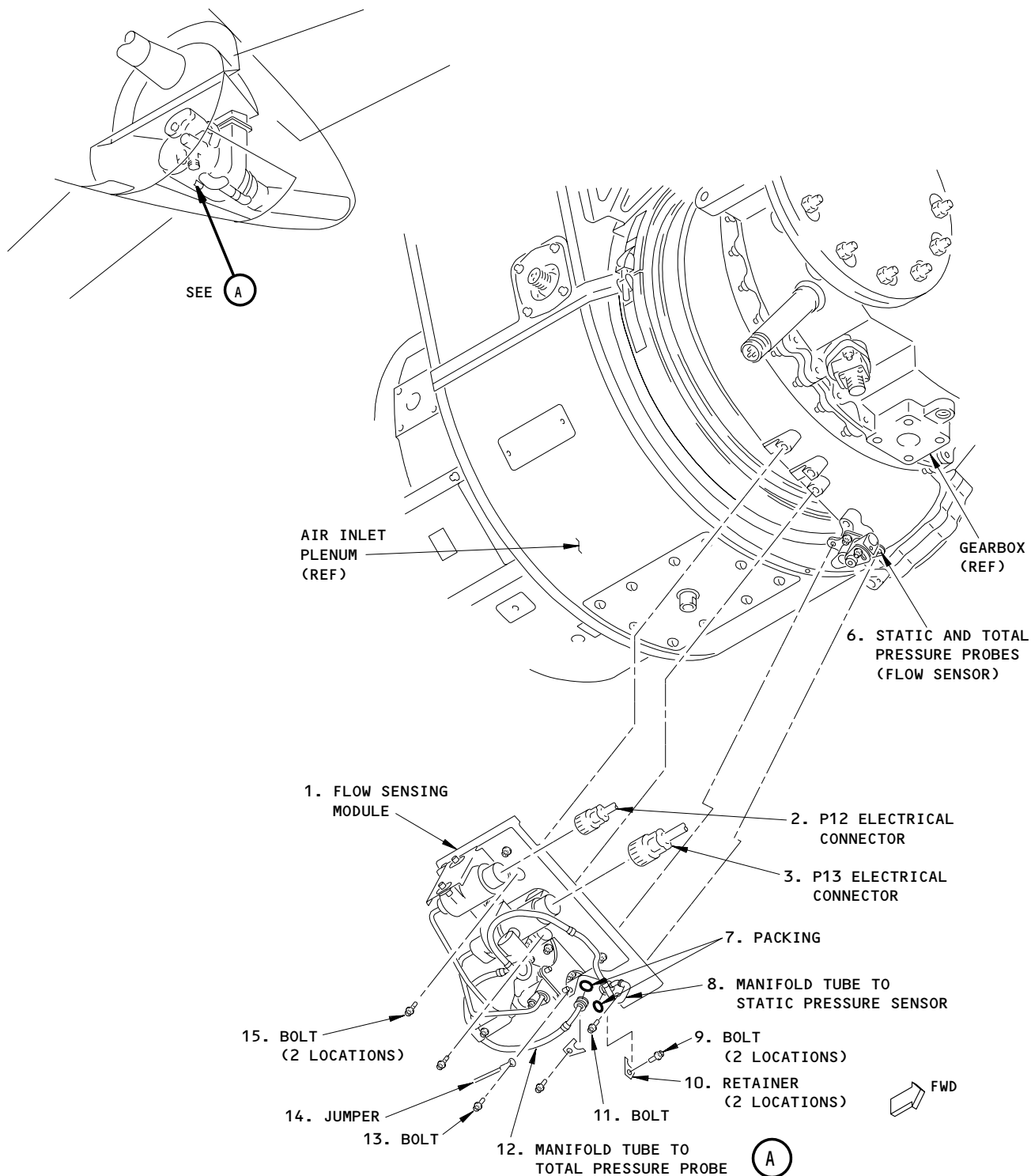
49-53-08



Flow Sensing Module Installation  
Figure 401 (Sheet 1)

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(PRE-HONEYWELL-SB 49-7711)

49-53-08



Flow Sensing Module Installation  
Figure 401 (Sheet 2)

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

49-53-08

01

Page 404  
Aug 22/04

**CAUTION:** BE CAREFUL WHEN YOU REMOVE THE MODULE. THE TOTAL PRESSURE SENSOR AND THE STATIC PRESSURE SENSOR ARE INSTALLED ON THE BOTTOM OF THE MODULE. DAMAGE TO THESE SENSORS CAN OCCUR.

- (c) Carefully remove the flow sensing module (1) and the gasket (4) from the APU.
  - 1) Discard the gasket (4).

S 024-051

- (5) APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711);  
Do these steps to remove the flow sensing module (1):

**NOTE:** The flow sensor (6) must not be replaced while the APU is installed in the airplane. Adjustment test of the flow sensor is necessary with the APU in the test cell.

- (a) Disconnect the electrical connectors P12 (2) and P13 (3) from the flow sensing module (1).
- (b) Remove the two bolts (9) and two retainers (10) that attach the two manifold tubes (8), (12) to the flow sensing module (1) and flow sensor (6).
- (c) Disconnect the manifold tube (8) from the static pressure sensor (flow sensor) (6).
- (d) Disconnect the manifold tube (12) from the total pressure probe (flow sensor) (6).
- (e) Remove and discard the two packings (7) from the two manifold tubes (8), (12).
- (f) Remove the bolt (13) that attaches the jumper (14) to the flow sensing module (1).
- (g) Remove the bolt (11) that attaches the flow sensing module (1) to the flow sensor (6).
- (h) Remove the two bolts (15) that attach the flow sensing module (1) to the scroll housing.
- (i) Carefully remove the flow sensing module (1) from the flow sensor (6).

**NOTE:** The baseplate of the flow sensing module (1) is located below the flange of the flow sensor (6).

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE

49-53-08

(j) Make sure you install all necessary protection covers.

TASK 49-53-08-404-006

3. Flow Sensing Module Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-61-05/201, APU Control Unit

B. Consumable Materials

- (1) G01048 Lockwire, Corrosion Resistant Steel (0.032 Inch Diameter) - NASM20995NC32
- (2) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (3) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Flow Sensing Module	49-53-00	01	103
	4	Gasket (PRE-HONEYWELL-SB 49-7711)			101
	7	Packing (POST-HONEYWELL-SB 49-7711)			97B

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE

**49-53-08**

01

Page 406  
Aug 22/07

E. Procedure

S 424-052

- (1) APU WITH THE FLOW SENSING MODULE (PRE-HONEYWELL-SB 49-7711);  
Do these steps to install the flow sensing module (1):  
(a) Install a new gasket (4) on the flow sensing module (1).

**CAUTION:** BE CAREFUL WHEN YOU INSTALL THE MODULE. THE TOTAL PRESSURE SENSOR AND THE STATIC PRESSURE SENSOR ARE INSTALLED ON THE BOTTOM OF THE MODULE. DAMAGE TO THESE SENSORS CAN OCCUR.

- (b) Carefully install the flow sensing module (1), with the new gasket (4), on the APU with the four bolts (5).  
1) Tighten the bolts (5) to 35 pound-inches (4.0 newton-meters).  
(c) Remove the caps on the electrical connectors (2 and 3) and the module components.  
(d) Connect the P12 electrical connector (2) and the P13 electrical connector (3) to the flow sensing module (1).  
1) Install lockwires on the electrical connectors (2 and 3).

S 424-054

**CAUTION:** REMOVE THE PROTECTION COVERS FROM THE OPENINGS AS NECESSARY. IF YOU DO NOT REMOVE THE PROTECTION COVERS, DAMAGE TO THE APU CAN OCCUR.

- (2) APU WITH THE FLOW SENSING MODULE (POST-HONEYWELL-SB 49-7711);  
Do these steps to install the flow sensing module (1):  
(a) Install the flow sensing module (1) to the flow sensor (6) and scroll housing with the two bolts (15).

**NOTE:** The baseplate of the flow sensing module (1) must be installed below the flange of the flow sensor (6).

- (b) Install the jumper (14) to the flow sensing module (1) with the bolt (13).
- (c) Install the bolt (11) that attaches the flow sensing module (1) to the flow sensor (6).
- (d) Tighten the four bolts (11), (13), (15) to 35 inch-pounds (4.0 newton-meters).
- (e) Install a lockwire on the bolt (11).
- (f) Lubricate the two new packings (7) with a light coat of oil or lubricant.
- (g) Install the two packings (7) on the two manifold tubes (8), (12).
- (h) Connect the manifold tube (8) to the static pressure sensor (flow sensor) (6).
- (i) Connect the manifold tube (12) to the total pressure probe (flow sensor) (6).
- (j) Install the two retainers (10) and two bolts (9) that attach the two manifold tubes (8), (12) to the flow sensing module (1) and flow sensor (6).
  - 1) Tighten the two bolts (9) to 35 inch-pounds (4.0 newton-meters).
- (k) Connect the electrical connectors P12 (2) and P13 (3) to the flow sensing module (1) and install a lockwire.

S 864-008

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 744-009

- (4) Do this task: APU Control Unit - Self-Test (AMM 49-61-05/201).

S 864-015

- (5) AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
Push the ERASE MEMORY switch on the ECU to erase the offset for the differential pressure transducer that was replaced.

**NOTE:** AIRPLANES WITH THE APU CONTROL UNIT -18 AND BEFORE;  
The ECU writes the offset for the differential pressure transducer. This offset can be different for every differential pressure transducer. Erase the ECU memory to remove the offset for the removed transducer. The ECU will make an offset for the installed transducer.

**NOTE:** AIRPLANES WITH -19 THRU -999 APU CONTROL UNIT;  
The ECU writes the offset for the differential pressure transducer each time the APU starts. The ECU does not keep values from before the last time the APU was started.

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE

49-53-08



S 414-010

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 864-011

- (7) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE

49-53-08

01

Page 409  
Apr 22/04

FLOW SENSING MODULE – CLEANING/PAINTING

1. General

- A. This procedure has the task to clean the flow sensor of the flow sensing module. The flow sensor has the total pressure probe and static pressure sensor.

TASK 49-53-08-107-015

2. Flow Sensor Cleaning (Fig. 701)

A. References

- (1) AMM 49-53-08/401, Flow Sensing Module

B. Equipment

- (1) Air Source – Regulated, Dry-Filtered, Compressed 60-105 psig (414-723.9 kPa) (22 SCFM) (commercially available)  
(2) Bit – Drill (0.020 to 0.040 Inch Diameter) (0.5 to 1.0 mm Diameter) (commercially available)

C. Consumable Materials

- (1) B00130 Alcohol, Isopropyl – TT-I-735 or  
(2) B00075 Solvent, Cleaning – MIL-PRF-680 Stoddard Type 1 (or equivalent)  
(3) G00034 Cloth, Process Cleaning Absorbent Wiper (Cheesecloth, Gauze) – BMS15-5 or  
(4) G02330 Brush, Stiff Bristle, Non-Metallic – Tampico GA55-1  
(5) G00434 Lockwire, Corrosion Resistant Steel (0.032 Inch Diameter) – NASM20995C32  
(6) G01674 Tape, Masking – VV-T-106

D. Access

(1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment – Right |
| 211 | Flight Compartment – Left     |
| 212 | Flight Compartment – Right    |
| 315 | APU Compartment – Left        |
| 316 | APU Compartment – Right       |

(2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door – Left  |
| 316AR | APU Access Door – Right |
| 822   | Aft Cargo Door          |

E. Procedure

S 867-017

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

49-53-08

S 867-018

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 017-019

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) While you hold the left access door in the closed position, open the four latches on the right access door.  
  

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.
  - (b) Open the left access door to the fully open position and manually lock the hold-open strut.  
  

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.
  - (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.  
  

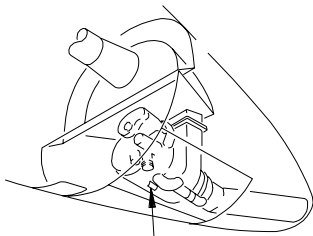
NOTE: The location of the detent latch is at the forward end of the right access door.
  - (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 027-005

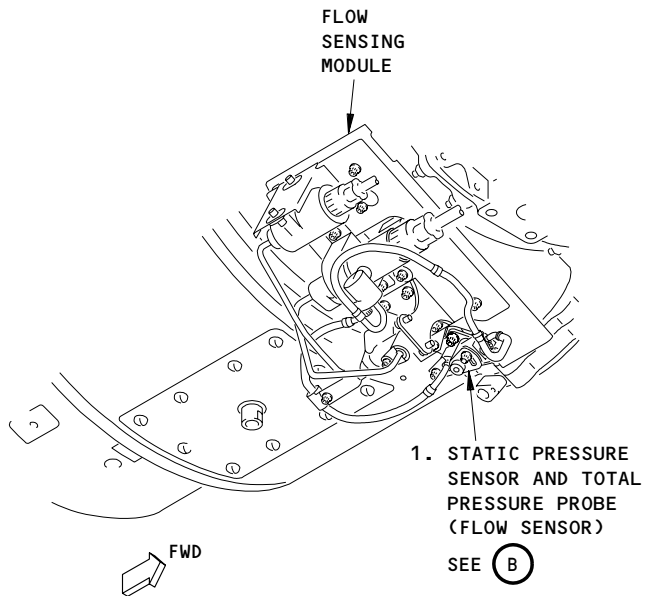
- (4) Do these steps to remove the flow sensor (1) from the APU:
  - (a) Remove the screw (2) that attaches the cover (3) to the flow sensor (1).
  - (b) Remove the cover (3).
  - (c) Remove the flow sensing module. To remove it, do this task: Flow Sensing Module Removal (AMM 49-53-08/401).
  - (d) Remove the two bolts (4) that attach the flow sensor (1) to the mounting boss on the APU.
  - (e) Carefully remove the flow sensor (1) and gasket (5) from the APU.

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

49-53-08



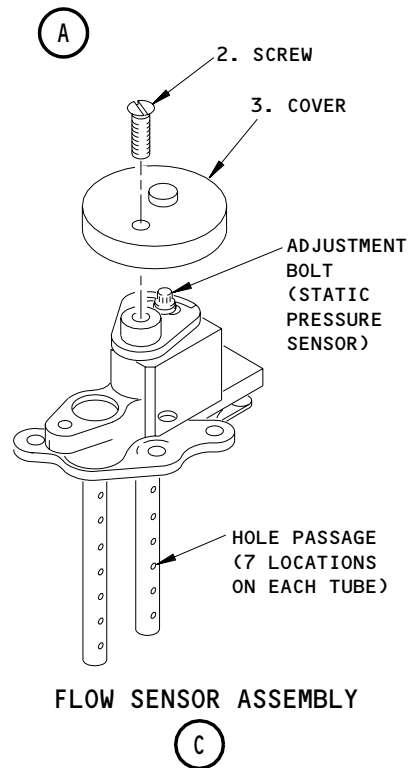
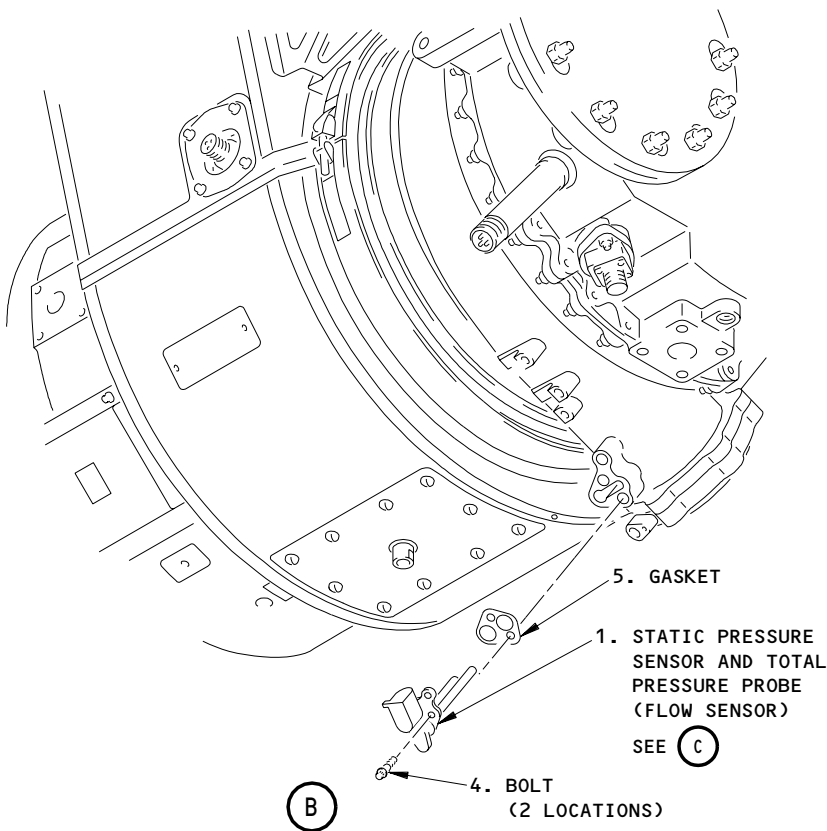
BOTTOM OF THE GEARBOX  
SEE (A)



FLOW SENSING MODULE

1. STATIC PRESSURE SENSOR AND TOTAL PRESSURE PROBE (FLOW SENSOR)  
SEE (B)

BOTTOM OF THE GEARBOX



FLOW SENSOR ASSEMBLY

Flow Sensor Cleaning  
Figure 701

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

49-53-08

(f) Discard the gasket (5).

S 117-016

(5) Do these steps to clean the flow sensor (1):

**WARNING:** DO NOT GET THE SOLVENT IN YOUR MOUTH, OR YOUR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE SOLVENT. PUT ON A PROTECTIVE SPLASH GOGGLE AND GLOVES WHEN YOU USE THE SOLVENT. KEEP THE SOLVENT AWAY FROM SPARKS, FLAME AND HEAT. THE SOLVENT IS A POISONOUS AND FLAMMABLE MATERIAL WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

**CAUTION:** DO NOT DISASSEMBLE THE COMPONENTS OF THE FLOW SENSOR TO CLEAN THE INTERNAL PARTS. IF YOU LOOSEN THE ADJUSTMENT BOLT FOR THE STATIC PRESSURE SENSOR, YOU MUST RE-CALIBRATE AND DO AN ADJUSTMENT TEST OF THE FLOW SENSOR AGAIN IN THE TEST CELL. DAMAGE TO EQUIPMENT CAN OCCUR.

- (a) Clean the exterior surfaces of the flow sensor (1) with alcohol or cleaning solvent and a cloth or brush.
- (b) Use a drill bit, lockwire or equivalent tool to carefully clear the 14 hole passages on the static pressure sensor and total pressure probe of unwanted materials.

**NOTE:** The diameter of the hole passage is 0.046-0.051 inch (1.2-1.3 mm).

- (c) Flush the exterior surfaces of the flow sensor (1) and the 14 hole passages with water.
- (d) Use the cloth to dry the exterior surfaces of the flow sensor (1).
- (e) Use the masking tape to cover the 12 hole passages on the static pressure sensor and total pressure probe but keep the hole passage at the end of each tube open.
- (f) Use the air source to blow the air through the hole passage at the end of each tube and through each tube.

**NOTE:** It is recommended that you use a pressure of 60-90 psig (414-620 kPa) of air or nitrogen to blow the air through each tube of the static pressure sensor and total pressure probe.

- (g) Make sure the air flows through each tube.
- (h) Remove the masking tape and make sure there is no remaining tape or adhesive material on each tube.

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

49-53-08

- (i) Clean the mounting boss of the flow sensor (1) on the APU with alcohol or cleaning solvent and a cloth or brush.
- (j) Use the cloth with water to clean and then dry the mounting boss.

S 427-020

- (6) Do these steps to install the flow sensor (1) on the APU:
  - (a) Install a new gasket (5) on the flow sensor (1).
  - (b) Install the flow sensor (1) with the two bolts (4).
    - 1) Tighten the two bolts (4) to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (c) Install the lockwire on the two bolts (4).
  - (d) Install the flow sensing module. To install it, do this task: Flow Sensing Module Installation (AMM 49-53-08/401).
  - (e) Install the cover (3) on the flow sensor (1) with the screw (2).

S 867-026

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 417-029

- (8) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.  
  

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
  - (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

49-53-08

 **BOEING**  
767  
MAINTENANCE MANUAL

- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 867-030

- (9) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY  
APU WITH THE FLOW SENSING MODULE  
(POST-HONEYWELL-SB 49-7711)

**49-53-08**

01

Page 706  
Dec 22/06

APU CONTROL SYSTEM – DESCRIPTION/OPERATION

1. General

- A. The APU controls consist of manual and automatic controls for starting, stopping, and maintaining the APU within safe limits during operation. Once an APU start is initiated, further control of the unit is fully automatic. The control system consists of APU mounted sensors which feed inputs into the Electronic Control Unit for the APU. The controller, in turn, feeds signals back to APU mounted torque-motors or up to the APU control panel in the flight compartment or Engine Indication and Crew Alerting System (EICAS) display panel. Electrical power for the system is 28 volts dc.
- B. If Airesearch SB 2117342-49-2195 has been done to the electronic control unit (ECU), the APU will have altitude start enhancements and start protection for low oil pressure. With the changed hardware, the starter will disengage at 42% RPM on the ground and 55% RPM at altitudes above 36,000 feet (10973 meters). Also, when the APU is initially started with low oil pressure, the APU will shutdown 15.5 seconds after it gets to 95% RPM (or one second if the APU oil temperature is greater than 20°F). The subsequent start with low oil pressure will cause a shutdown one second after the APU gets to 95% RPM. The APU will then not start if there is low oil pressure.

2. Component Details

- A. APU Control Panel – P5 Panel (Fig. 1)
  - (1) The APU control panel is located on the overhead panel and contains the master control switch for the APU, FAULT light, and RUN light. The master control switch is a three-position switch with a momentary START position. The amber FAULT light illuminates with a failure to start or a fault causing APU shutdown. FAULT also illuminates momentarily while the fuel valve is in transit. The white RUN light illuminates when APU reaches 95% speed. The RUN light also flashes twice to indicate that the control unit has completed the system self test.
- B. Power Controls – P5 Panel (Fig. 1)
  - (1) The bleed air switch for the APU is located on overhead panel P5. It opens the shutoff valve for the APU bleed air to allow APU bleed air to flow to the airplane cabin (AMM 36-10-00/001). The generator control switch for the APU is also located on overhead panel P5. It excites the APU generator field and supplies power to the generator control unit for the APU (AMM 24-22-00/001). The APU must be at 95% speed for either pneumatic or electrical loading.

EFFECTIVITY

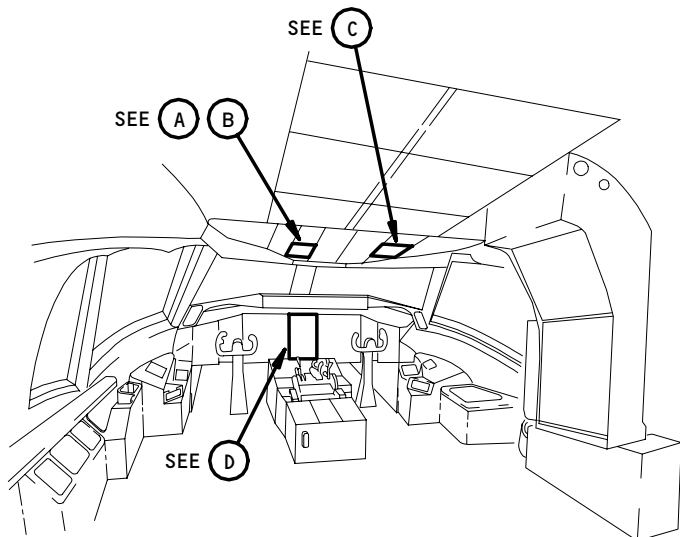
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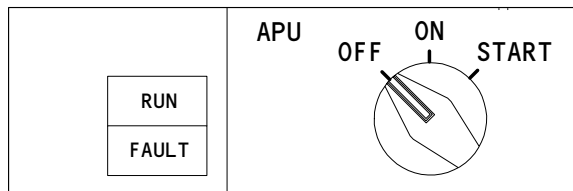
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Page 1  
Feb 10/97



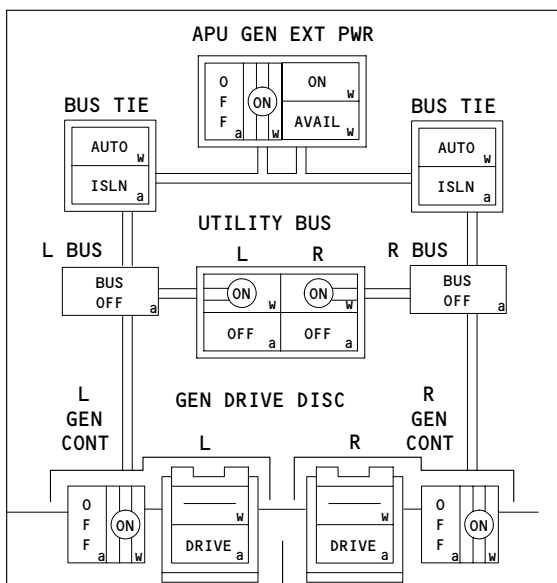


FLIGHT COMPARTMENT



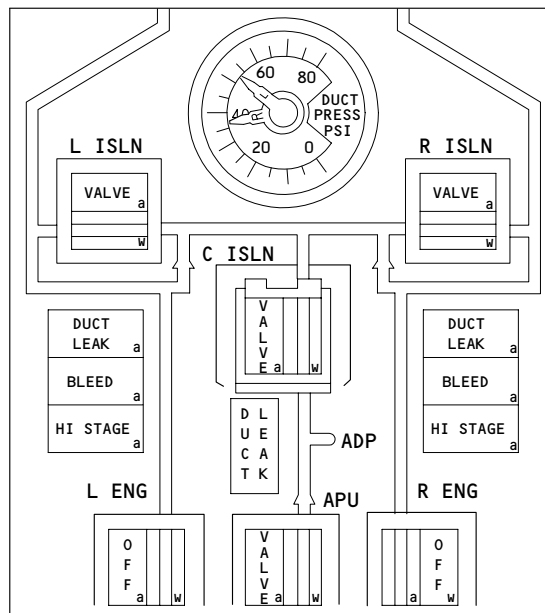
APU CONTROL PANEL, P5

(A)



CONTROL PANEL, P5, FOR THE ELECTRICAL SYSTEM

(B)



CONTROL PANEL, P5, FOR THE BLEED AIR

(C)

APU Engine Controls Locations  
Figure 1 (Sheet 1)

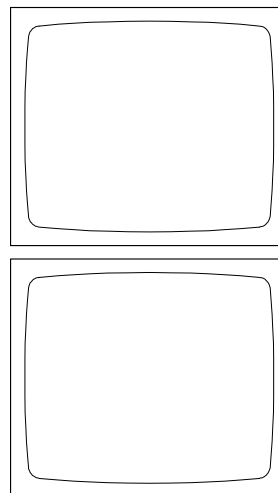
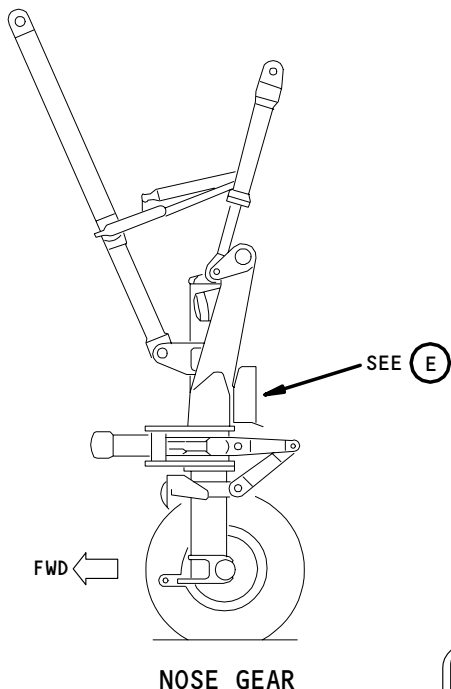
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ALL

49-61-00

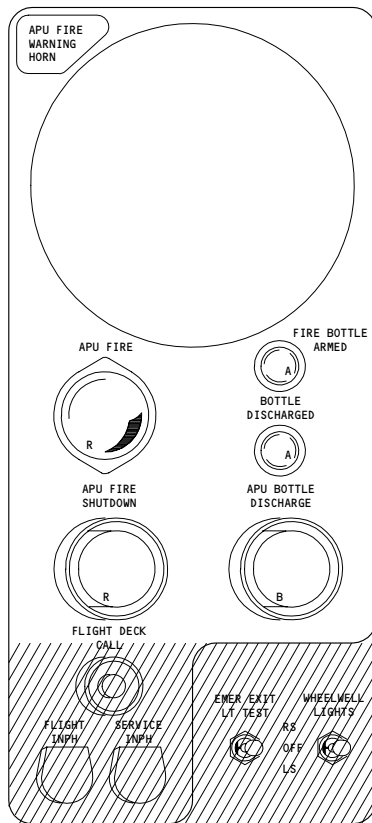
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Page 2  
May 10/92



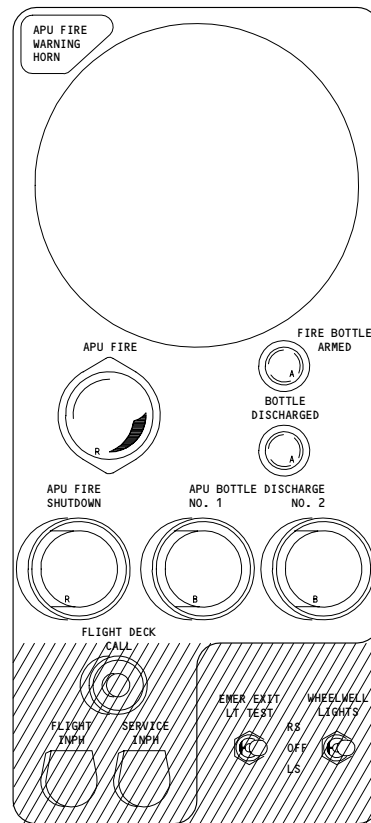
**EICAS DISPLAY PANEL (P2)**

(D)



**APU SHUTDOWN PANEL (P40)**

(E) 1



**APU SHUTDOWN PANEL (P40)**

(E) 2

- 1 AIRPLANES WITH SINGLE FIRE BOTTLE
- 2 AIRPLANES WITH DUAL FIRE BOTTLE

**APU Engine Controls Locations  
Figure 1 (Sheet 2)**

EFFECTIVITY	ALL
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**49-61-00**

- C. Maintenance and Status Indication – Engine Indication and Crew Alerting System (EICAS) Display Panel (Fig. 1)
- (1) The EICAS messages shown for the APU are the APU FAULT, APU DOOR, APU OIL QTY, APU BITE, APU RPM, and APU EGT.
    - (a) The APU FAULT message is shown as a level C alert when the APU had a protection shutdown.
    - (b) The APU DOOR is shown with EICAS in the status or maintenance modes when the door is not in its commanded position.
    - (c) The APU OIL QTY is shown in the EICAS status and maintenance modes when there are 4.25 quarts of oil in the APU gearbox (oil reservoir).
    - (d) APU BITE is displayed on the EICAS maintenance page when one of the following faulty LRUs is stored in memory: LCIT SENSOR, #1 SPD SENSOR, #2 SPD SENSOR, LOP SWITCH, EGT #1 CIRCUIT, EGT #2 CIRCUIT, DEOIL SOL, FLOW DIV SOL, HOT SENSOR, P2 SENSOR, FAN VALVE, FILTER SW(GEN).
    - (e) The APU RPM shows the engine speed with EICAS in the status and maintenance modes.
    - (f) The APU EGT shows the exhaust gas temperature with EICAS in the status and maintenance modes.
- D. APU Shutdown Panel – P40 Panel (Fig. 1)
- E. APU Control Unit (ECU)
- (1) The electronic control unit (ECU) is a microprocessor based digital control system. It governs the engine starting sequence, acceleration, governed speed operation, operation within temperature limits, control for the inlet guide vanes, surge valve control, and the engine shutdown. The input signals to the control unit are utilized by it to supply control signals to various accessories. The input signals from the APU are engine speed, exhaust gas temperature, air inlet temperature and pressure, high oil temperature, low oil pressure, position of the fan isolation valve, position of the air intake door, actuator position of the inlet guide vanes, differential pressure switch for the generator filter, and signals for the differential and total pressure transducer. Signals from the aircraft are the shutoff valve position for the bleed air, demand for the air driven pump (ADP), demand for the environmental control system (ECS), air/ground signal, and the command signal for the main engine start (MES). The control unit has two separate systems for automatic shutdown protection: normal shutdown logic (hardware shutdown) and redundant shutdown logic (software shutdown). The control unit is located on the aft equipment center in the E6 rack, and panel type mounting.

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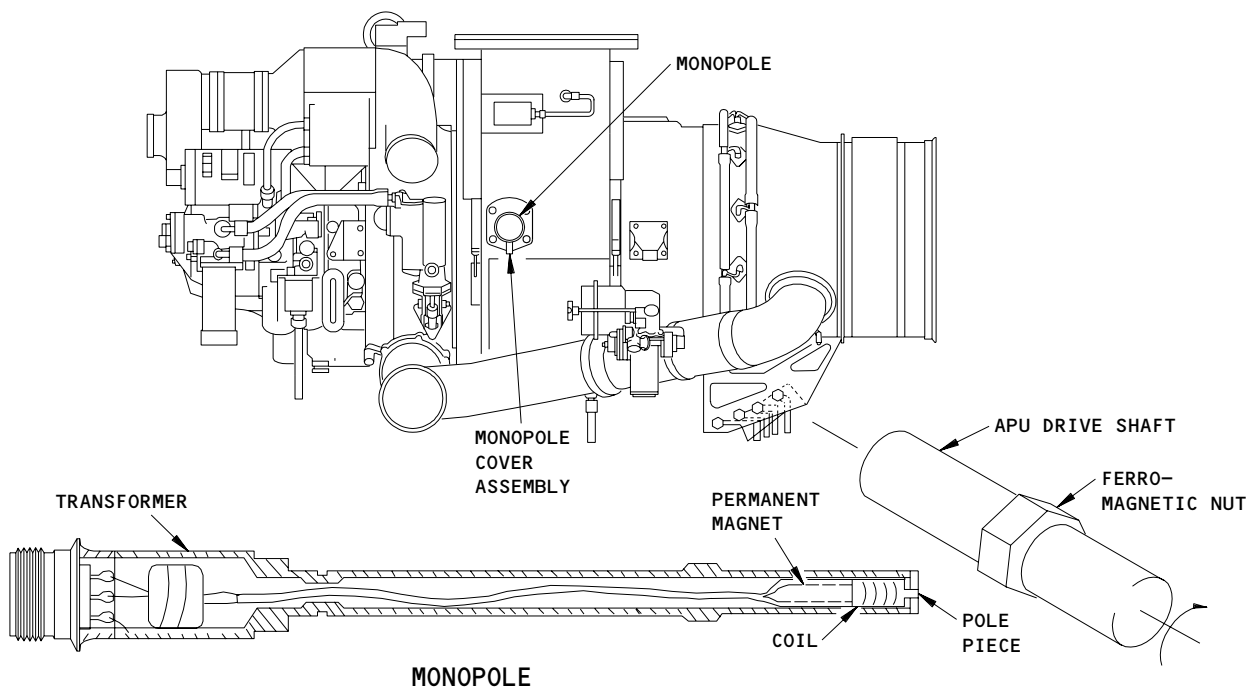
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49-61-00

- (2) The ECU supplies an integral BITE (Built-In Test Equipment) function to help the line maintenance technician do APU trouble-shooting. The ECU continuously monitors and stores data about APU shutdowns and failures of Line Replaceable Units (LRUs). The BITE memory can be interrogated while the APU operates or after shutdown. It recalls the stored data, shows the causes for up to four protective shutdowns and gives LRU failure indications. The APU must be shutdown for the ECU to perform the self test.

F. Monopole (Fig. 2)

- (1) The monopole is a variable reluctance transducer which is magnetic and does not touch the parts. It converts mechanical motion into an electrical signal. A ferromagnetic nut mounted on the APU drive shaft produces an electrical pulse in the monopole every time it passes. Monopole assemblies on the left and right sides of the inlet plenum transmit electrical signals to the APU control unit.

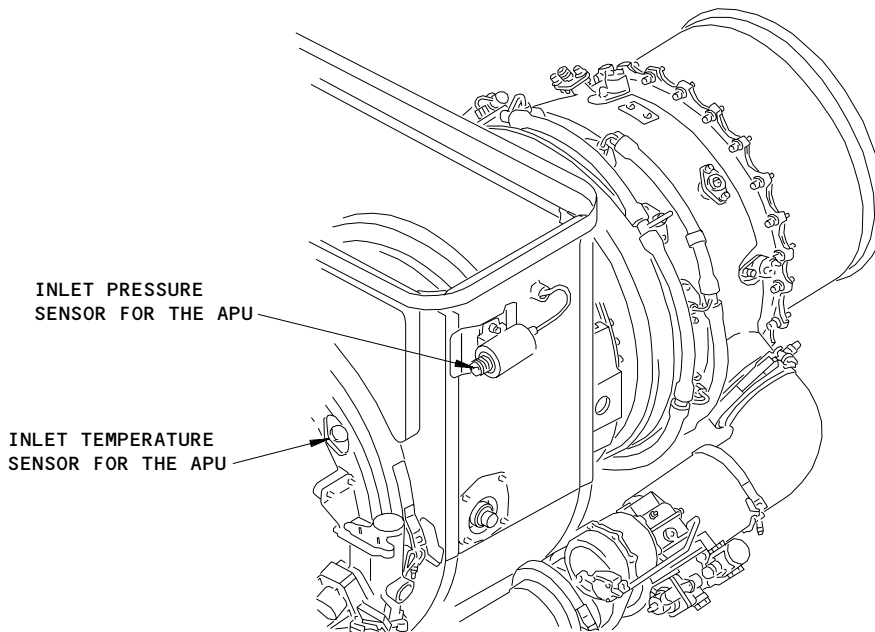


APU Monopole Location  
Figure 2

EFFECTIVITY	
	ALL

49-61-00

- G. Inlet Temperature Sensor for the APU (Fig. 3)
- (1) The inlet temperature (LCIT) sensor for the load compressor is a chromel-alumel unit for rapid response to temperature changes. The thermocouple senses temperature increases associated with ambient changes, reverse flow conditions, and surges in the load compressor. The APU control unit will shut down the engine if the inlet temperature exceeds 210°F or increases more than 60°F in 1.1 seconds. The sensor is located forward of the inlet plenum near the upper mount of the actuator for the inlet guide vanes.
- H. Inlet Pressure Sensor for the APU (Fig. 3)
- (1) The inlet pressure (P2) sensor is a solid state transducer which is piezo-resistive with a sensing element that is a silicon strain gage. It provides a 0-5 volt dc signal proportional to the inlet pressure. The APU control unit uses its signal to modify the engine fuel schedule. The sensor is mounted on the left side near the top of the inlet plenum.
- I. APU Control Relays
- (1) The APU control relays and the APU control unit control APU starting and shutdown. The relays are located on three panels; APU control panel P5, panel P37 in the compartment for the main electrical equipment and in the aft equipment center in the E6 rack.



APU Inlet Pressure and Temperature Sensors  
Figure 3

EFFECTIVITY

ALL

49-61-00

02

Page 6  
Dec 22/05

3. Operation

A. APU Normal Shutdown

- (1) APU normal shutdown is initiated by placing the master control switch for the APU from ON to OFF. This immediately causes the initiation of the shutdown time delay of 60 seconds. The shutdown time delay is also initiated by closure of the air supply valve for the APU. After the 60 second delay, the APU control unit runs a self test of its overtemperature shutdown logic. A fault is stored in BITE memory if the test fails. At the conclusion of the time delay, shutdown is accomplished by injecting a 109% test speed signal to the overspeed shutdown circuit for the primary hardware. This de-energizes the fuel solenoid valve. If, after 20 seconds, the APU speed is above 85%, the APU will shutdown using the protective shutdown (software).

B. APU Remote Shutdown

**CAUTION:** DO NOT USE THE APU FIRE SHUTDOWN SWITCH ON THE P40 APU SHUTDOWN PANEL FOR NORMAL APU SHUTDOWN. THIS ARMS THE FIRE BOTTLE(S) AND BYPASSES THE APU COOLDOWN CYCLE.

- (1) APU remote shutdown is initiated by pressing the APU FIRE SHUTDOWN switch on the P40 shutdown panel for the APU. The APU fire relay (K2) is energized which removes power from APU start and fuel control relays (K1, K175) and sends a fire signal of 28 volt dc to the ECU. The control unit initiates a software protective shutdown. The de-energized relay for the APU fuel control closes the fuel shutoff valve for the APU. APU protective shutdown is recorded in BITE memory. The APU FAULT light (P5) and APU FAULT level C EICAS message provide shutdown indication on the flight deck.

**NOTE:** For more information on APU fire detection refer to AMM 26-15-00/001.

- (2) When the APU is shut down at the P40 panel, APU restart is inhibited by a latched relay for the external shutdown. In order to unlatch the system, two things must be done:
  - (a) APU control switch (P5 panel) must be cycled OFF.
  - (b) The main battery switch (P5 panel) must be cycled OFF then ON, or the circuit breakers that follow on the main distribution panel P6 must be cycled open then closed:
    - 1) 6G1, APU FIRE EXT 1

EFFECTIVITY

ALL

49-61-00

02

Page 7  
Dec 22/03

2) AIRPLANES WITH DUAL FIRE BOTTLES;  
6G2, APU FIRE EXT 2

C. Protective Shutdown Systems

- (1) The APU control system will initiate a protective shutdown with any of the following conditions:
  - (a) Overspeed
  - (b) Overtemperature
  - (c) Normal overspeed circuit failure
  - (d) Reverse flow (signaled by high inlet temperature of the load compressor)
  - (e) High oil temperature (above 305°F)
  - (f) Low oil pressure (below 35 psi)
  - (g) Differential pressure switch for the generator filter (above 35 psid)
  - (h) Fire emergency
  - (i) Air intake door failed closed
  - (j) Loss of dc power
  - (k) No flame
  - (l) ECU internal failure
  - (m) Start abort
    - 1) Loss of EGT during start
    - 2) No acceleration during start
  - (n) Underspeed
- (2) Protective Shutdown
  - (a) When one of these conditions exists, the APU control unit performs the following: closes the fuel solenoid valve for the APU, de-energizes the ignition unit, closes the shutoff valve for the APU bleed air, opens the generator field, closes the inlet guide vanes and opens the surge bleed valve. In addition, the unit indirectly closes the air intake door for the APU and de-energizes the dc fuel pump for the APU. A protective shutdown illuminates the FAULT light on the master control panel and displays APU FAULT as a level C EICAS message. The shutdown is processed the same as a normal shutdown; a 109% overspeed shutdown is injected into the system. The APU control unit stores the cause of the shutdown and the associated faulty LRU in its memory. The APU can be restarted.
  - (b) If the APU is initially started with low oil pressure, the APU will shutdown 15.5 seconds after it gets to 95% RPM (or one second if the APU oil temperature is greater than 20°F). The subsequent start with low oil pressure will cause a shutdown one second after the APU gets to 95% RPM. The APU will then not start if there is low oil pressure.

EFFECTIVITY

ALL

49-61-00

05

Page 8  
Apr 22/01

- (3) Redundant Protective Shutdown
  - (a) If the protective shutdown for usual overspeed fails to shutdown the APU, the APU will shutdown using the redundant protective shutdown. A magnetic latch is tripped in the control unit requiring control unit replacement before restarting the APU. The shutdown de-energizes or closes the same components as the normal shutdown, and in addition de-energizes the torque metering valve for the fuel control.

D. BITE

- (1) The APU BITE panel is on the front of the APU control unit on the E6 rack in the aft equipment center. The BITE panel has two matrices of lights that come on to show APU system faults. The upper REASON APU NOT OPERATING matrix shows reasons for protective shutdowns. The lower FAULTY LRU matrix shows faulty system components.
- (2) The LAMP TEST and SELF TEST toggle switch is on the upper right corner of the BITE panel. When the switch is put in the LAMP TEST position, with the APU off, all of the panel lights come on, column by column from left to right, for 4 seconds each. When the switch is put in the LAMP TEST position while the APU operates, the lamp test does not occur. If the switch is held in the LAMP TEST position, miniflags are shown (FIM 49-11-00/101, Fig. 103). When the switch is put in the SELF TEST position, the control unit automatically does a system self test. The WAIT lamp will come on during the test. The TEST OK lamp comes on with a satisfactory test. Any units that have a failure will come on in an unsatisfactory test. The APU must be off to do the self test.
- (3) BITE memory
  - (a) As many as four faults for consecutive shutdowns can be stored in the BITE non-volatile memory. The faults are stored in a last-in, first-out basis. The RECORD SELECT switch selects which fault (LAST RUN, 2, 3, or 4) is shown. The FAULT REASON and FAULT LRU toggle is a momentary switch which controls the display of system faults. When put in the FAULT REASON position, the selected system shutdown fault will come on. The lights stay on for 4 seconds. When put in the FAULT LRU position, all faulty components related to the system shutdown will come on for 4 seconds. If no FAULTY LRU is stored, the SEE MNT MANUAL light will come on. When the RECORD SELECT switch is in the SUMMARY position, and the FAULT switch is in the LRU position, FAULTY LRU lights will come on for four seconds. These lights show all of the FAULTY LRU's stored in BITE memory since the last time memory was erased. If no FAULTY LRU is stored, the NO DATA lamp will come on. The ERASE MEMORY switch manually erases all stored memory.

EFFECTIVITY

ALL

49-61-00

08

Page 9  
Apr 22/01



 **BOEING**  
767  
MAINTENANCE MANUAL

- (b) APU BITE shows on the EICAS maintenance page when one of the following faulty units is stored in memory: LCIT SENSOR, #1 SPD SENSOR, #2 SPD SENSOR, LOP SWITCH, EGT #1 CIRCUIT, EGT #2 CIRCUIT, DEOIL SOL, FLOW DIV SOL, HOT SENSOR, P2 SENSOR, FAN VALVE, FILTER SW(GEN).
- E. For more details on the APU Control System, refer to these wiring diagrams and functional schematics:  
WDM 49-61-11: Auxiliary Power Unit Control System  
SSM 49-00-06: Auxiliary Power Unit Control and BITE.

EFFECTIVITY

ALL

**49-61-00**

02

Page 10  
Apr 22/04

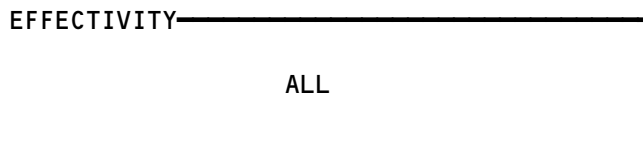

**BOEING**  
 767  
 FAULT ISOLATION/MAINT MANUAL

APU CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	REFERENCE
MONOPOLE - YBMTS8, YBMTS9	1	2	315AR, 316AL, APU COMP	49-61-02
PANEL - APU CONTROL, M1	1	1	FLT COMPT, P5	*
SENSOR - APU INLET PRESSURE, YBMTS4	1	1	315AR, 316AL, APU COMP	49-61-04
SENSOR - APU INLET TEMPERATURE, YBMTS5	1	1	315AR, 316AL, APU COMP	49-61-03
UNIT - AUXILIARY POWER CONTROL, M206	1	1	822, AFT EQUIP CTR, E6	49-61-05

\* SEE THE WDM EQUIPMENT LIST

APU Control System - Component Index  
Figure 101



**49-61-00**

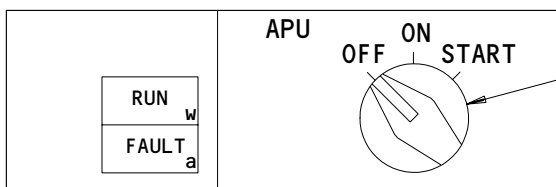
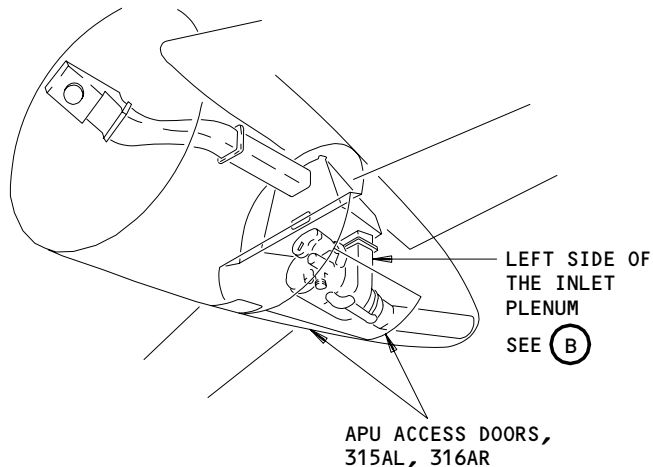
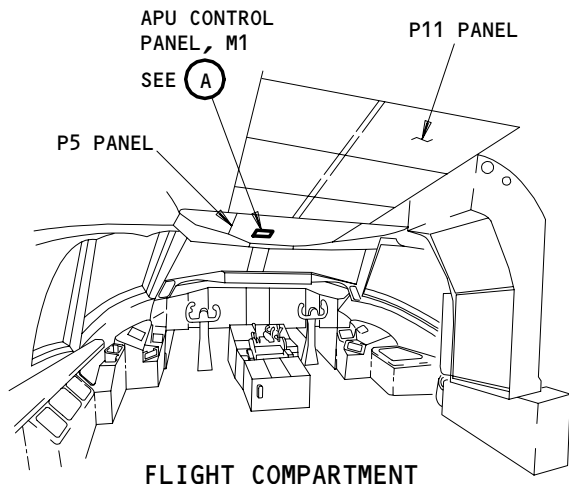
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Page 101  
Feb 10/92

35268

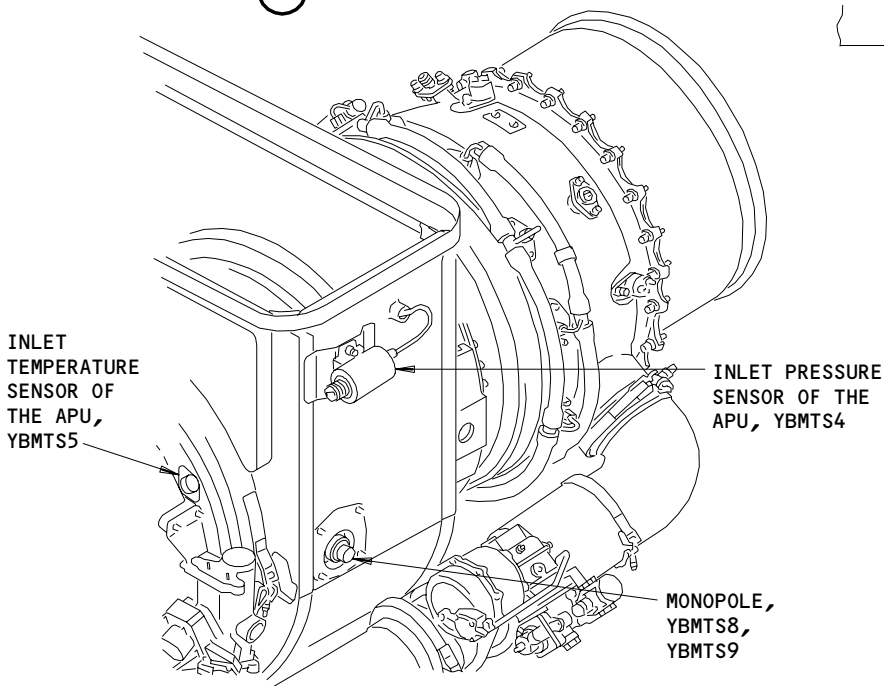
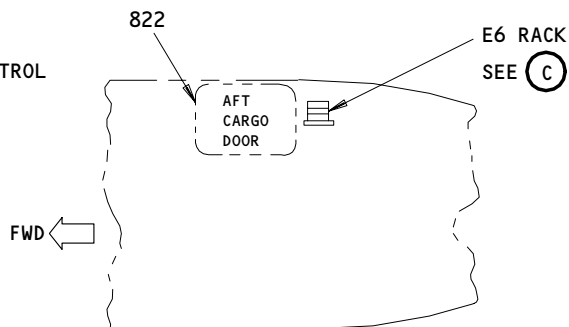
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## 767 FAULT ISOLATION/MAINT MANUAL



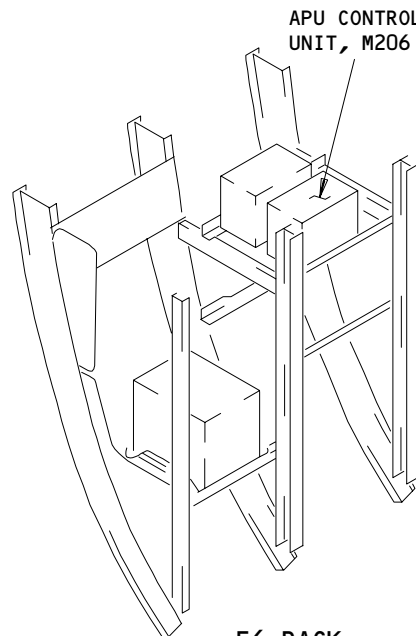
APU CONTROL PANEL, M1

(A)



LEFT SIDE OF THE INLET PLENUM

(B)



E6 RACK

(C)

APU Control System - Component Location  
Figure 102

EFFECTIVITY

ALL

49-61-00

01

Page 102  
Feb 10/92

34538

APU RPM MONOPOLES - REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the APU RPM monopoles.
- B. There are two RPM monopoles for the APU. There is one monopole on each side of the air inlet plenum, near the bottom.
- C. You can get access to the APU RPM monopoles through the APU access doors.

TASK 49-61-02-004-001

2. APU RPM Monopole Removal (Fig. 401)

A. Special Tools and Equipment

- (1) 294864-1 Wrench - Monopole, Garrett Airline Services Division,  
Garrett Corporation, P.O. Box 29003, Phoenix, AZ  
85072

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

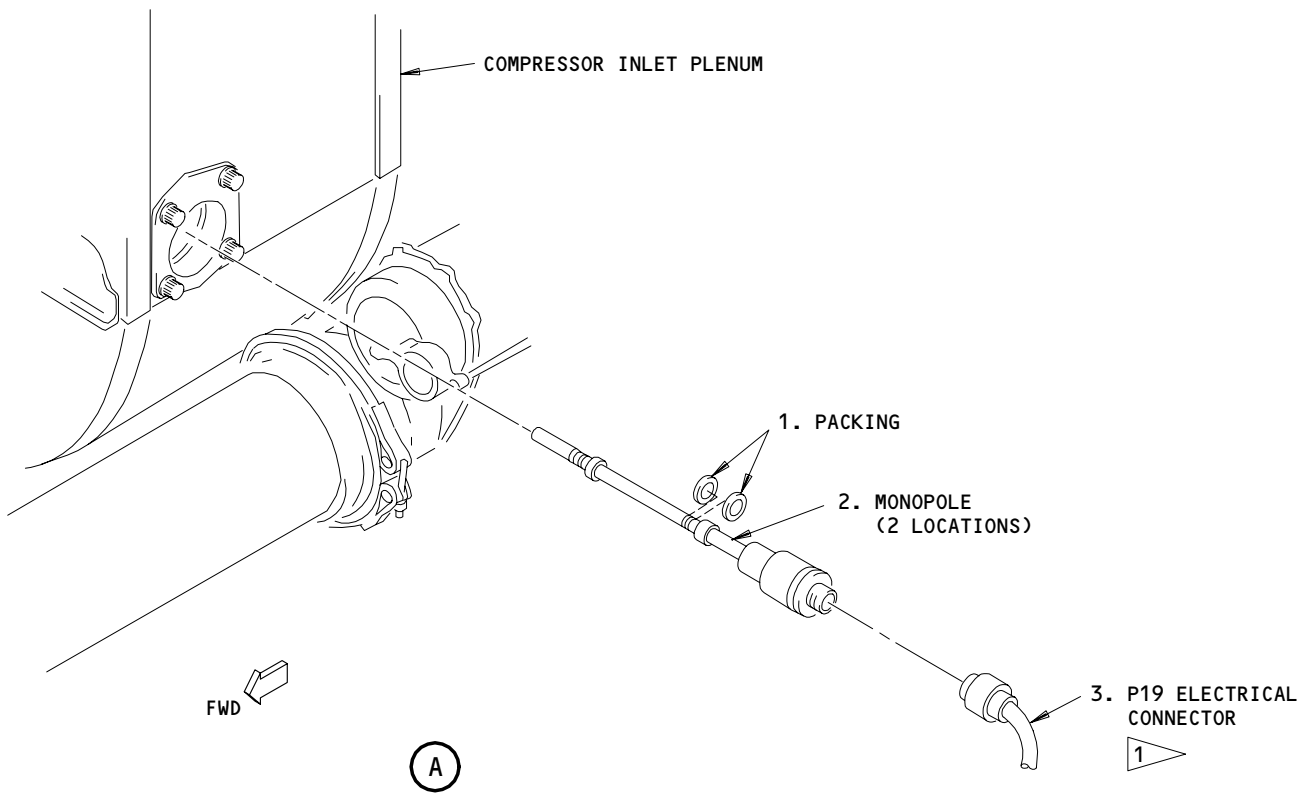
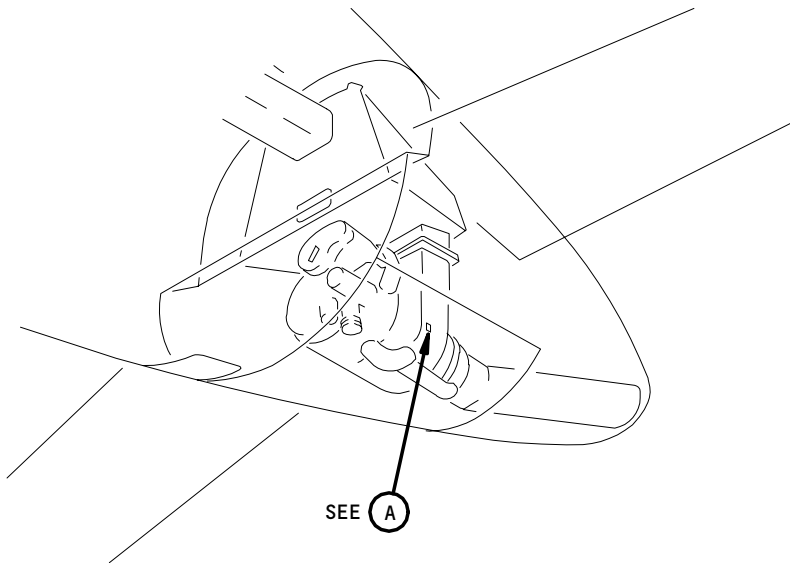
EFFECTIVITY

ALL

49-61-02

01

Page 401  
Aug 22/01



**NOTE:** THE LEFT APU MONOPOLE IS SHOWN.  
THE RIGHT APU MONOPOLE IS THE SAME.

1 P18 ELECTRICAL CONNECTOR  
ON THE RIGHT MONOPOLE.

APU Monopoles (RPM) Installation  
Figure 401

EFFECTIVITY	
	ALL

49-61-02

01

Page 402  
May 10/91

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the APU RPM monopole(s):
  - (a) Disconnect the electrical connector (3) (P18 or P19) from the applicable monopole (2).
  - (b) Install caps on the electrical connector (3) and the mating receptacle for protection.
  - (c) Use the monopole wrench to remove the applicable monopole (2) and the packings (1) from the air inlet plenum.
    - 1) Discard the packings (1).
  - (d) Install a plug in the inlet plenum opening for protection.

TASK 49-61-02-404-006

3. APU RPM Monopole Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-61-05/201, APU Control Unit

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or

EFFECTIVITY

ALL

49-61-02

04

Page 403  
Dec 22/02

(2) D00341 Lubricant - Santovac 5  
C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Packing (Left Side)	49-61-00	01	10 or
		Packing (Right Side)		01A	10
	2	Monopole (Left Side)		01	80 or
		Monopole (Right Side)		01A	80
			01	5 or	
			01A	5	
			01	75 or	
			01A	75	

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the APU RPM monopole(s):
- (a) Remove the plug from the inlet plenum opening(s).
  - (b) Lubricate the new packings (1) with a light coat of lubricant or oil.
  - (c) Install the packings (1) on the applicable monopole (2).
  - (d) Install the applicable monopole (2) in the air inlet plenum.

**CAUTION:** DO NOT TIGHTEN THE MONOPOLE TOO MUCH. DAMAGE TO THE MONOPOLE CAN OCCUR.

- 1) Tighten the monopole with your hand only.
- (e) Remove the caps from the electrical connector (3) and the mating receptacle.
- (f) Connect the electrical connector (3) (P18 or P19) to the applicable monopole (2).
- (g) Install a lockwire on the applicable electrical connector (3).

EFFECTIVITY

ALL

49-61-02

01

Page 404  
Aug 22/05

S 734-008

- (2) Do this task: APU Control Unit - Self-Test (AMM 49-61-05/201).

S 414-009

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 864-010

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 864-011

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 714-012

- (6) Do an operational test of the APU RPM monopoles:

(a) Do this task: APU Starting and Operation (AMM 49-11-00/201).

(b) During the APU operation, look at the RPM indication in the flight compartment to make sure the monopoles operate.

(c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

EFFECTIVITY

ALL

49-61-02

04

Page 405  
Apr 22/04



INLET TEMPERATURE SENSOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the temperature sensor on the APU air inlet.
- B. The inlet temperature sensor is on the bottom left side of the air inlet plenum. You can get access to the sensor through the APU access doors.

TASK 49-61-03-004-001

2. Inlet Temperature Sensor Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

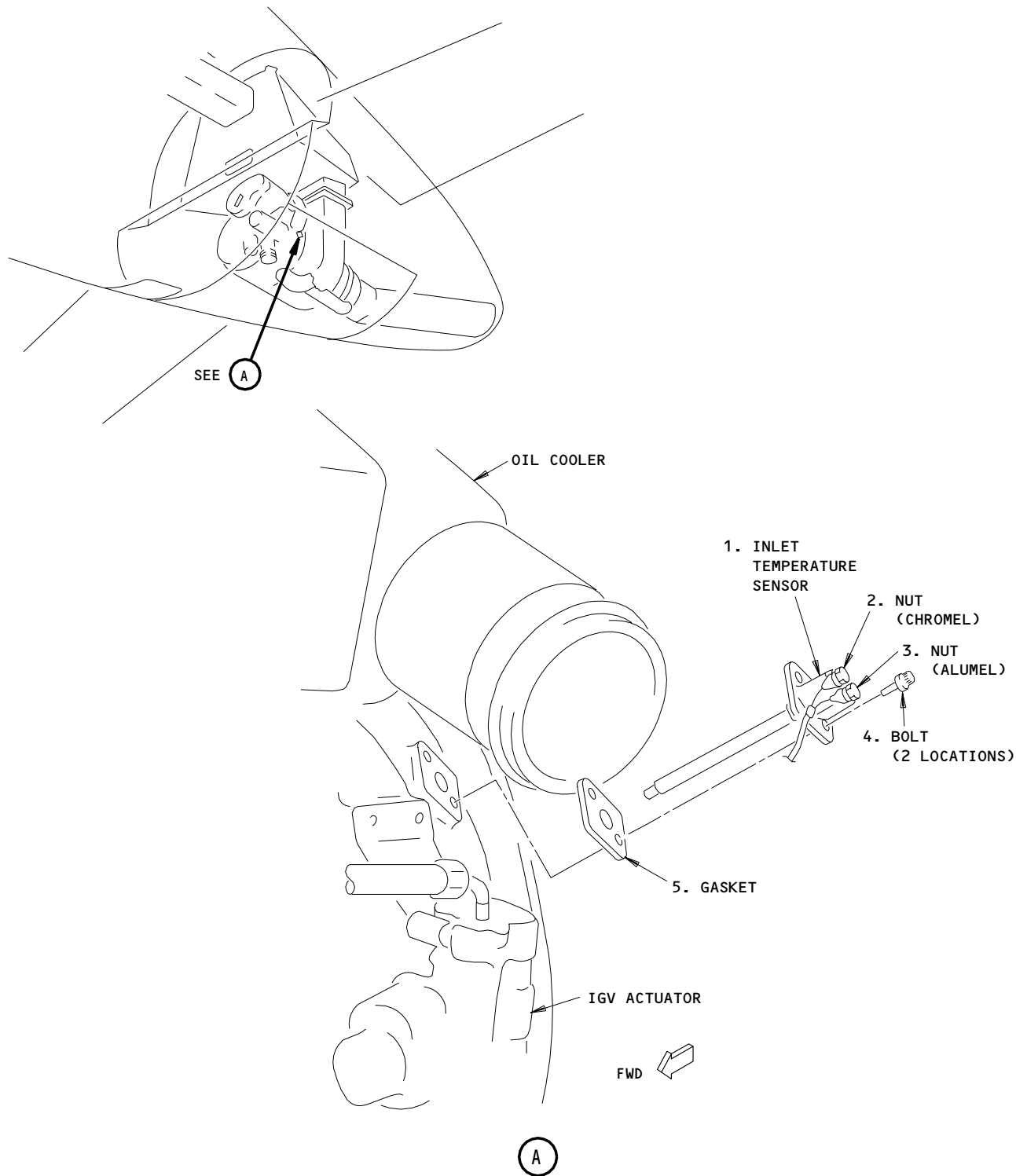
EFFECTIVITY

ALL

49-61-03

03

Page 401  
Aug 22/01



Inlet Temperature Sensor Installation  
Figure 401

EFFECTIVITY	
ALL	

49-61-03

01

Page 402  
Apr 22/99

16579

2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the inlet temperature sensor:

(a) Loosen the nuts (2 and 3) that attach the wires to the inlet temperature sensor (1).

(b) Disconnect the wires from the inlet temperature sensor (1).

(c) Remove the bolts (4) that attach the inlet temperature sensor (1) to the air inlet plenum.

(d) Remove the inlet temperature sensor (1) and the gasket (5) from the air inlet plenum.

1) Discard the gasket (5).

TASK 49-61-03-404-006

3. Inlet Temperature Sensor Installation (Fig. 401)

A. References

(1) AMM 49-11-00/201, Auxiliary Power Unit

(2) AMM 49-61-05/201, APU Control Unit

EFFECTIVITY

ALL

49-61-03

02

Page 403  
Aug 22/01

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Inlet Temperature Sensor	49-61-00	01	120 or
	5	Gasket		01A	120
				01	140 or
				01A	140

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 424-007

- (1) Install the inlet temperature sensor:
- (a) Install the inlet temperature sensor (1) and the new gasket (5) on the air inlet plenum with the bolts (4).
    - 1) Tighten the bolts (4) to 40 inch-pounds (4.5 newton-meters).
  - (b) Connect the electrical wires to the inlet temperature sensor (1) with the nuts (2 and 3).
    - 1) Tighten the nut (2) to 25-27 inch-pounds (2.8-3.1 newton-meters).
    - 2) Tighten the nut (3) to 15-17 inch-pounds (1.7-1.9 newton-meters).

S 734-008

- (2) Do this task: APU Control Unit - Self-Test (AMM 49-61-05/201).

EFFECTIVITY

ALL

**49-61-03**

01

Page 404  
Aug 22/05

S 414-009

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 864-010

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 864-011

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 714-012

- (6) Do an operational test of the APU:

(a) Do this task: APU Starting and Operation (AMM 49-11-00/201).

(b) Make sure the APU operates correctly.

(c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).

EFFECTIVITY

ALL

**49-61-03**

03

Page 405  
Aug 22/01

INLET PRESSURE (P2) SENSOR – MAINTENANCE PRACTICES

1. General

- A. This procedure contains these three tasks:
  - (1) Inlet Pressure Sensor Removal
  - (2) Inlet Pressure Sensor Installation
  - (3) Inlet Pressure Sensor Inspection.
- B. The inlet pressure (P2) sensor is on the left side of the APU inlet duct below the plenum flange seal. You can get access to the sensor through the APU access doors.

TASK 49-61-04-002-001

2. APU Inlet Pressure (P2) Sensor Removal (Fig. 201)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 862-002

- (1) Make sure the APU control switch on the P5 panel and attach a DO-NOT-OPERATE tag.

S 862-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

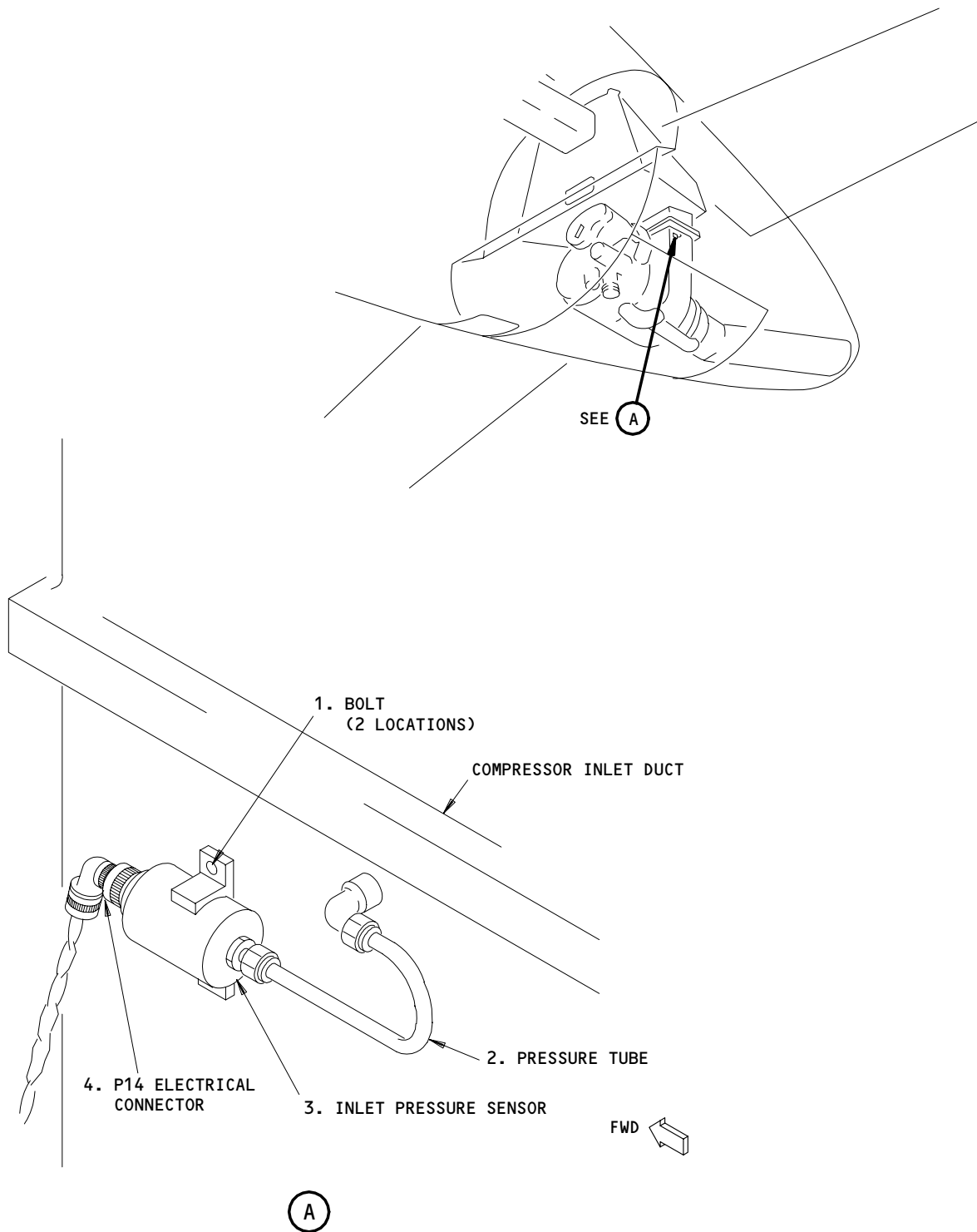
EFFECTIVITY

ALL

49-61-04

01

Page 201  
Aug 22/01



APU Inlet Pressure Sensor Installation  
Figure 201

EFFECTIVITY

ALL

49-61-04

01

Page 202  
May 10/91

16581

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 012-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 022-005

- (4) Remove the inlet pressure sensor:
  - (a) Disconnect the pressure tube (2) from the inlet pressure sensor (3).
  - (b) Disconnect the P14 electrical connector (4) from the inlet pressure sensor (3).
  - (c) Remove the two bolts (1) that attach the inlet pressure sensor (3) to the APU inlet plenum.
  - (d) Remove the inlet pressure sensor (3) from the APU inlet plenum.

EFFECTIVITY

ALL

49-61-04

03

Page 203  
Aug 22/01



TASK 49-61-04-402-006

3. Inlet Pressure (P2) Sensor Installation (Fig. 201)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	3	Inlet Pressure Sensor	49-61-00	01 01A	110 or 110

B. References

- (1) AMM 49-61-05/201, APU Control Unit

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 422-007

- (1) Install the inlet pressure sensor:
- (a) Attach the inlet pressure sensor (3) to the APU inlet plenum with the two bolts (1).
    - 1) Tighten the bolts (1) to 50-55 inch-pounds (5.7-6.2 newton-meters).
  - (b) Connect the P14 electrical connector (4) to the inlet pressure sensor (3).
  - (c) Connect the pressure tube (2) to the inlet pressure sensor (3).

S 732-008

- (2) Do this task: APU Control Unit - Self-Test (AMM 49-61-05/201).

EFFECTIVITY

ALL

**49-61-04**

01

Page 204  
Aug 22/05

S 412-009

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.  
 (c) Lift the left access door until the two APU access doors are approximately aligned.  
 (d) Close the two APU access doors.  
 (e) Close the four latches on the right access door.

S 862-010

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) P49 APU Auxiliary Panel  
     1) 49C2, APU PRIME CONT  
     2) 49C3, APU START  
 (b) P11 Overhead Panel  
     1) 11B35, APU ALTN CONT

S 862-011

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

TASK 49-61-04-202-012

4. Inlet Pressure (P2) Sensor Inspection

A. Standard Tools and Equipment

- (1) Multimeter

B. Access

- (1) Location Zones

- |     |                               |
|-----|-------------------------------|
| 154 | Aft Cargo Compartment - Right |
| 211 | Flight Compartment - Left     |
| 212 | Flight Compartment - Right    |
| 315 | APU Compartment - Left        |
| 316 | APU Compartment - Right       |

- (2) Access Panels

- |       |                         |
|-------|-------------------------|
| 315AL | APU Access Door - Left  |
| 316AR | APU Access Door - Right |
| 822   | Aft Cargo Door          |

C. Procedure

S 012-013

- (1) If it is installed, remove the inlet pressure sensor (Ref par. 2).

EFFECTIVITY

ALL

49-61-04

03

Page 205  
 Aug 22/01

S 212-014

- (2) Visually examine the inlet pressure sensor:
- (a) Examine the inlet pressure sensor for cracks, chips, and other damage.
  - (b) Make sure the sensor inlet port does not have blockage.
  - (c) Make sure the pressure tube for the sensor does not have blockage.

S 282-015

- (3) Measure the resistance between pin 5 on the electrical receptacle and the sensor case.
- (a) The resistance must not be more than 0.025 ohms.

S 412-016

- (4) Install the inlet pressure sensor (Ref par. 3).

EFFECTIVITY

ALL

49-61-04

01

Page 206  
Apr 22/99

APU CONTROL UNIT (ECU) – MAINTENANCE PRACTICES

1. General

A. This procedure contains these tasks:

- (1) A self test to look for internal failures of the APU control unit
- (2) A BITE test to look for failures in the memory of the APU control unit.

B. The APU control unit is installed on the E6 rack in the aft cargo compartment. You can get access to the control unit through the aft cargo door.

TASK 49-61-05-742-044

2. APU Control Unit – Self Test

A. References

- (1) AMM 24-22-00/201, Electrical Power – Control
- (2) FIM 49-11-00/101, Auxiliary Power Unit

B. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment – Right
- (2) Access Panels
  - 822 Aft Cargo Door

C. Procedure

S 862-031

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

S 862-032

- (2) Make sure this circuit breaker on the overhead circuit breaker panel, P11, is closed:
  - (a) 11B35, APU ALTN CONT

S 862-046

- (3) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

EFFECTIVITY

ALL

49-61-05

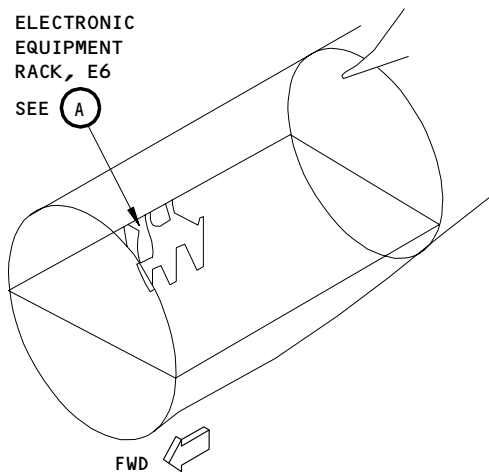
04

Page 201  
Aug 22/01

# BOEING

## 767 MAINTENANCE MANUAL

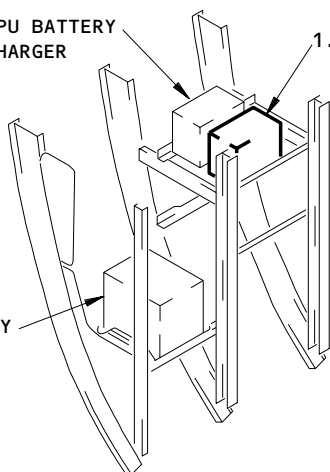
ELECTRONIC EQUIPMENT RACK, E6  
SEE (A)



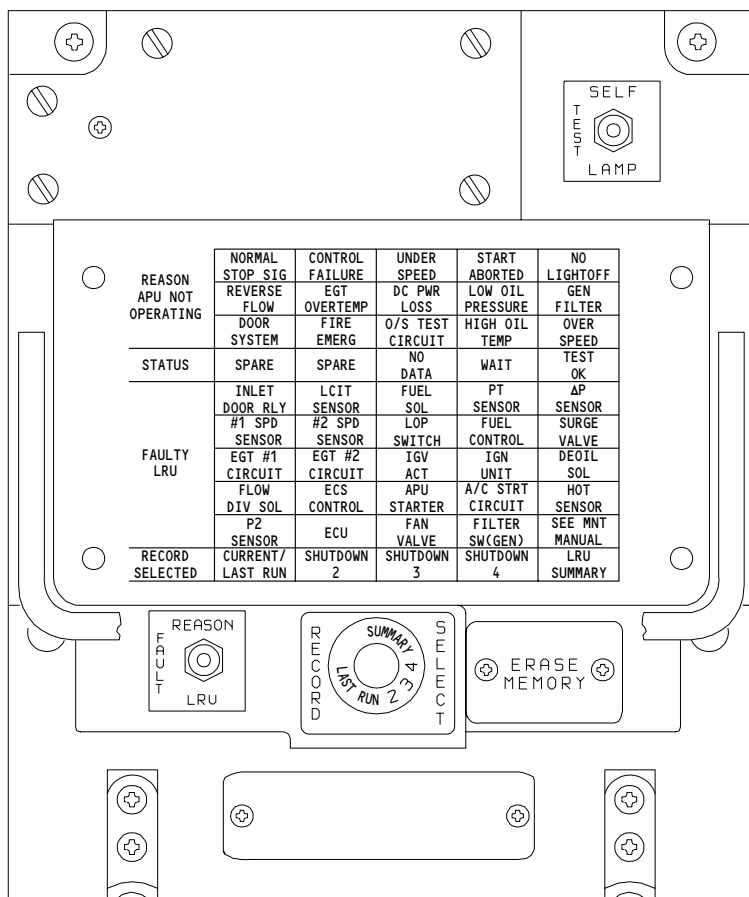
APU BATTERY CHARGER

1. APU CONTROL UNIT  
SEE (B)

APU BATTERY



ELECTRONIC EQUIPMENT RACK, E6



APU CONTROL UNIT  
(FRONT PANEL)

(B)

APU BITE Procedure  
Figure 201

EFFECTIVITY

ALL

49-61-05

03

Page 202  
Aug 22/99

H93647

S 212-047

- (4) Make sure the APU RPM is less than 7%.

S 742-033

- (5) Put the TEST switch on the APU control unit in the LAMP position and release the switch.
- (a) Make sure all of the lights come on, column by column.
  - (b) If all of the lights do not come on, replace the APU control unit.

S 742-034

**WARNING:** DO NOT DO THE ECU BITE TEST AND MAINTENANCE ON THE IGNITION SYSTEM AT THE SAME TIME. THE IGNITER LEAD ENERGIZES DURING THE SELF-TEST AND CAN CAUSE AN INJURY.

- (6) Put the TEST switch to the SELF position and release the switch.

**NOTE:** This will do a test of the software in the APU control unit and of the APU hardware.

- (a) The WAIT light will come on during the test.
- (b) The TEST OK light will come on if the self-test does not find defective units.
- (c) Make a record of the FAULTY LRU lights that come on.

**NOTE:** The FAULTY LRU lights will come on one at a time for 4 seconds (from the left to the right and from the top to the bottom of the control unit).

- (d) If FAULTY LRU lights came on, correct the failure (FIM 49-11-00, Fig. 103).

TASK 49-61-05-742-045

3. APU Control Unit - BITE Test

A. General

- (1) The APU control unit BITE test can be done with the APU in operation. If you do the APU control unit BITE test with the APU in operation, the APU control unit self test is not done.

EFFECTIVITY

ALL

49-61-05

03

Page 203  
Dec 10/98

B. References

- (1) AMM 24-22-00/201, Electrical Power - Control
- (2) FIM 49-11-00/101, Auxiliary Power Unit

C. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
- (2) Access Panels
  - 822 Aft Cargo Door

D. Procedure

S 742-037

- (1) IF THE APU IS NOT IN OPERATION;  
Do the APU Control Unit - Self Test.

S 862-038

- (2) Put the RECORD SELECT switch to the LAST RUN position.

S 742-039

- (3) Put the FAULT switch to the LRU position and release.

NOTE: This does a check for the FAULTY LRUs that could have caused the last auto-shutdown failure on the APU.

- (a) Make a record of the FAULTY LRU lights that come on.

NOTE: If there are FAULTY LRUs, the lights will come on at the same time for 6 seconds.

S 862-040

- (4) Put the FAULT switch to the REASON position.

NOTE: The APU shutdowns are put in the memory of the control unit. You can see the reason for the last shutdown when the RECORD SELECT switch is in the LAST RUN position.

- (a) Make a record of the REASON APU NOT OPERATING lights that come on.

EFFECTIVITY

ALL

49-61-05

04.1

Page 204  
Aug 22/01

S 812-041

- (5) Correct the failures for the REASON APU NOT OPERATING and the FAULTY LRU lights that you recorded (FIM 49-11-00, Fig. 103).

S 862-042

- (6) Push the ERASE MEMORY switch to erase the failures from the memory of the APU control unit.

NOTE: If the APU control unit is being replaced, do not erase the APU control unit memory. If you erase the APU control unit memory, the failure history used to diagnose and repair the unit will be lost.

S 862-043

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

EFFECTIVITY

ALL

49-61-05

05

Page 205  
Aug 22/07



APU CONTROL UNIT (ECU) – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the APU control unit (ECU)
  - (2) An installation of the APU control unit.
- B. The APU control unit is installed on the E6 rack in the aft cargo compartment. You can get access to the control unit through the aft cargo door.

TASK 49-61-05-004-001

2. APU Control Unit (ECU) Removal (Fig. 401)

- A. References
  - (1) AMM 20-10-01/401, E/E Rack Mounted Components

- B. Access
  - (1) Location Zones
    - 154 Aft Cargo Compartment – Right

- (2) Access Panels
    - 822 Aft Cargo Door

C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open this circuit breaker on the overhead circuit breaker panel, P11, and attach a DO-NOT-CLOSE tag:
  - (a) 11B35, APU ALTN CONT

S 014-004

- (3) Open the aft cargo door.

S 864-051

- (4) Open these circuit breakers on the P49 APU Auxiliary Panel and attach DO-NOT-OPERATE tags:
  - (a) 49C2, APU PRIME CONT

EFFECTIVITY

ALL

49-61-05

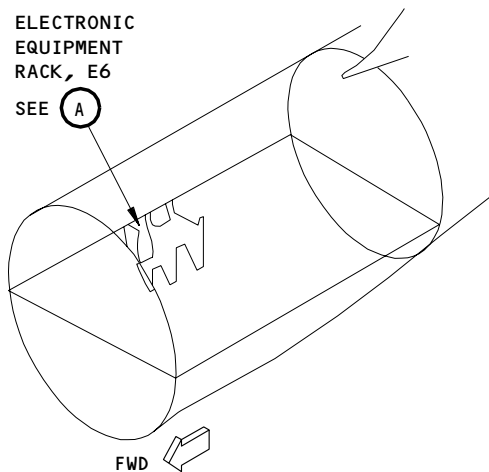
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Page 401  
Dec 22/07

# BOEING

## 767 MAINTENANCE MANUAL

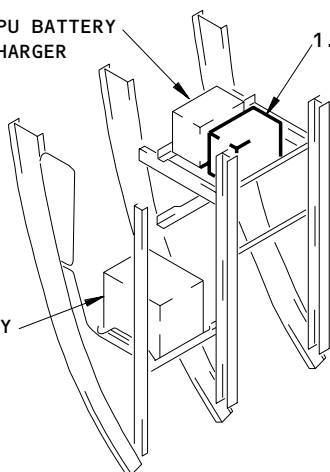
ELECTRONIC  
EQUIPMENT  
RACK, E6  
SEE (A)



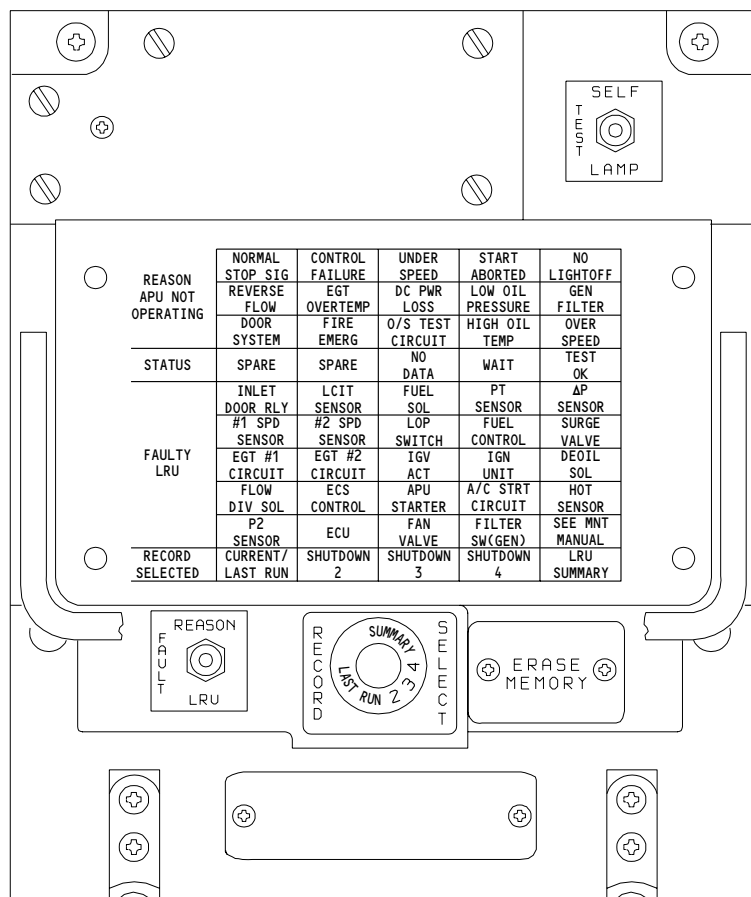
APU BATTERY  
CHARGER

1. APU CONTROL  
UNIT  
SEE (B)

APU BATTERY



ELECTRONIC EQUIPMENT RACK, E6



APU CONTROL UNIT  
(FRONT PANEL)

(B)

APU Control Unit (ECU) Installation  
Figure 401

EFFECTIVITY

ALL

49-61-05

03

Page 402  
Aug 22/99

E59226

(b) 49C3, APU START

S 024-007

(5) Remove the APU control unit (1) (AMM 20-10-01/401).

TASK 49-61-05-404-008

3. Install the APU Control Unit (Fig. 401)

A. References

(1) AMM 20-10-01/401, E/E Rack Mounted Components

(2) AMM 49-61-05/201, APU Control Unit

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
201	1	APU Control Unit (ECU)	49-61-05	01 01A 01B  01C  02 02A	5 or 5 or 10 or 155 or 10 or 155 or 5 or 5

C. Access

(1) Location Zones

154 Aft Cargo Compartment - Right

(2) Access Panels

822 Aft Cargo Door

D. Procedure

S 424-009

(1) Install the APU control unit (1) (AMM 20-10-01/401).

S 864-049

(2) Remove the DO-NOT-CLOSE tags and close these circuit breakers on the P49 APU Auxiliary Panel:

(a) 49C2, APU PRIME CONT

(b) 49C3, APU START

EFFECTIVITY

ALL

**49-61-05**

03

Page 403  
Dec 22/08

- S 744-010
- (3) Do this task: APU Control Unit - BITE procedure (AMM 49-61-05/201).
- S 414-013
- (4) Close the aft cargo door.
- S 864-014
- (5) Remove the DO-NOT-CLOSE tag and close this circuit breaker on the overhead circuit breaker panel, P11:  
(a) 11B35, APU ALTN CONT
- S 864-015
- (6) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-61-05

08

Page 404  
Dec 22/08

APU EXHAUST GAS TEMPERATURE INDICATING SYSTEM – DESCRIPTION AND OPERATION

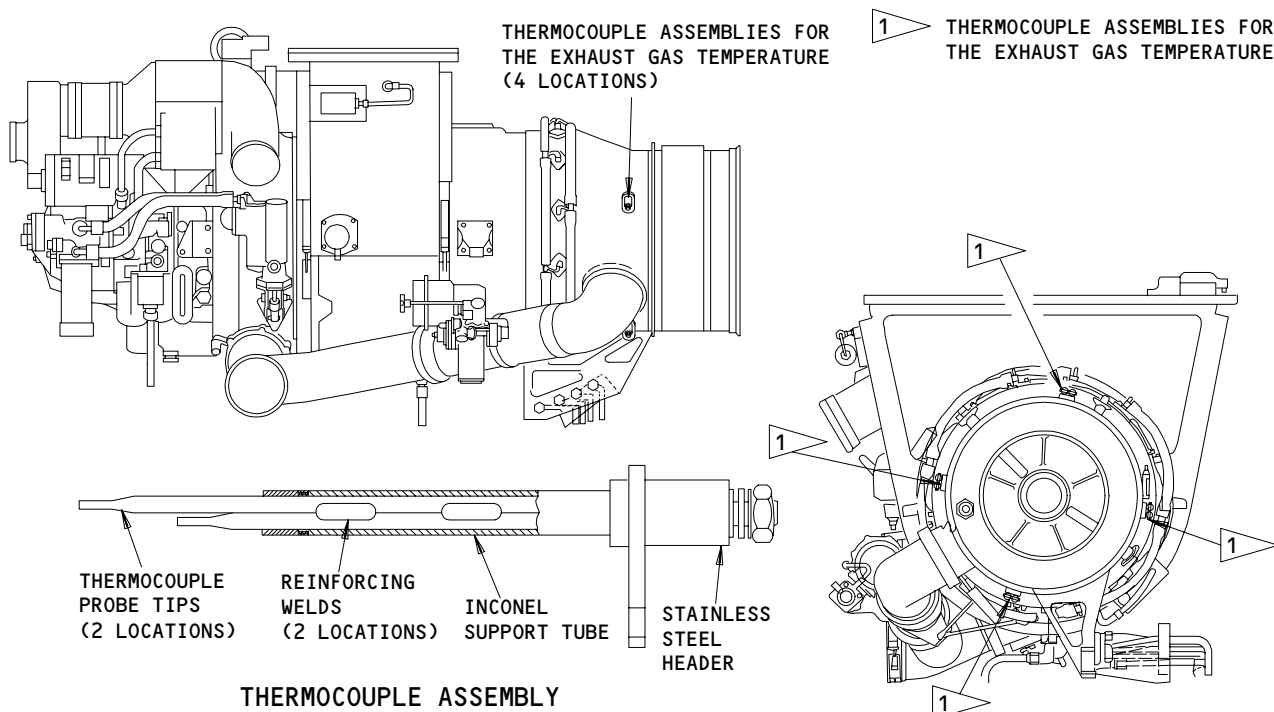
1. General

A. The APU indicating system for the exhaust gas temperature (EGT) measures the temperature of the exhaust gas and provides EGT indication in the flight compartment. The system consists of thermocouple probes, APU control unit, and EICAS indication. Power for the system is 28 volts dc from the main battery bus.

2. Component Details

A. Thermocouple Assemblies (Fig. 1)

(1) Exhaust gas temperature for the APU is sensed by four thermocouple assemblies equally spaced aft of the power section. A pair of thermocouples, enclosed in an inonel support tube with a stainless steel header, make up each assembly. A pair of assemblies make up a rake.



APU Exhaust Gas Temperature Assemblies  
Figure 1

EFFECTIVITY	
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**49-71-00**

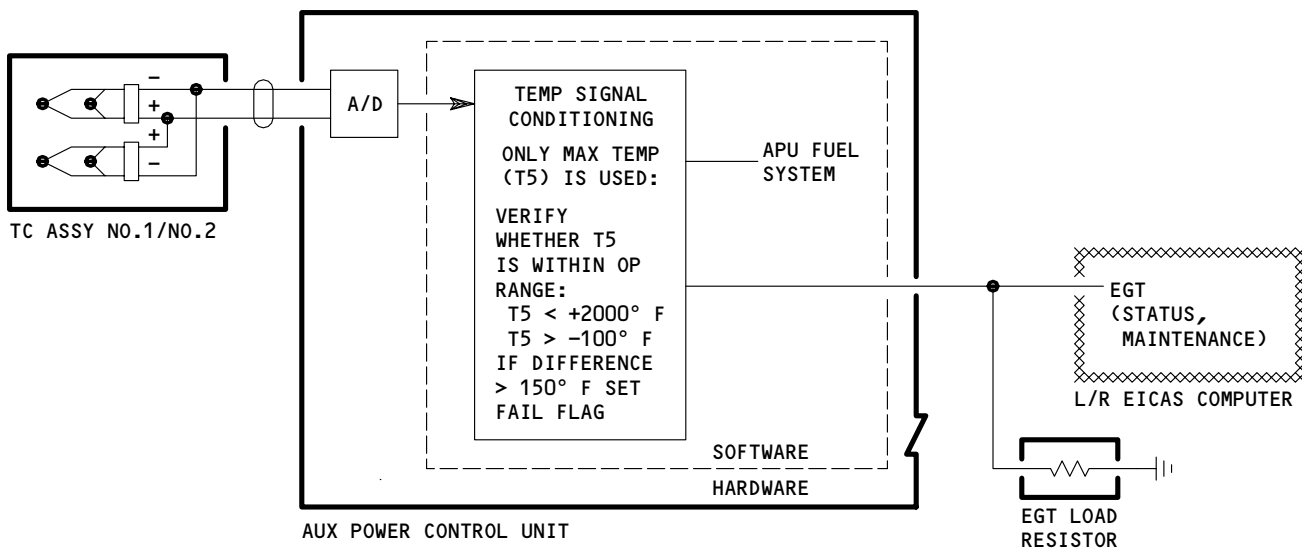
3. Operation

A. Functional Description (Fig. 2)

(1) The two thermocouple rakes supply EGT signals to the APU control unit. The control unit uses the higher signal for comparison to the trim schedule for the ultimate temperature. If EGT exceeds the schedule, fuel flow to the APU is reduced. The control unit provides for normal and redundant protective shutdowns for an overtemperature. A normal overtemperature shutdown occurs when a normal EGT schedule is exceeded for 0.5 second. A redundant overtemperature shutdown occurs when the ultimate EGT schedule is exceeded for 0.1 seconds. The higher EGT signal is supplied to the Engine Indication and Crew Alerting System (EICAS) where it can be called up in either the status or maintenance modes.

B. BITE

(1) The APU control unit monitors the operation of the EGT indicating system, tests component circuits, and writes any failures in BITE memory (AMM 49-61-00/001). A failure of the thermocouples or the ECU is shown in the FAULTY LRU matrix as EGT #1 CIRCUIT, EGT #2 CIRCUIT or ECU. An automatic shutdown because of OVER TEMP or START ABORTED is shown in the REASON APU NOT OPERATING matrix.



APU Exhaust Gas Temperature Indicating System Schematic  
Figure 2

EFFECTIVITY	ALL
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49-71-00

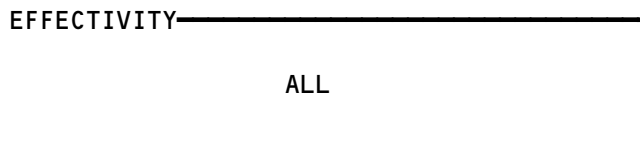


767  
FAULT ISOLATION/MAINT MANUAL

APU EXHAUST GAS TEMPERATURE INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
ASSEMBLY - APU EGT THERMOCOUPLE, YBMTS6,YBMTS7 UNIT - (FIM 49-61-00/101) AUXILIARY POWER CONTROL, M206	--	2	316AR,315AL, APU COMPT	49-71-01

APU Exhaust Gas Temperature Indicating System - Component Index  
Figure 101

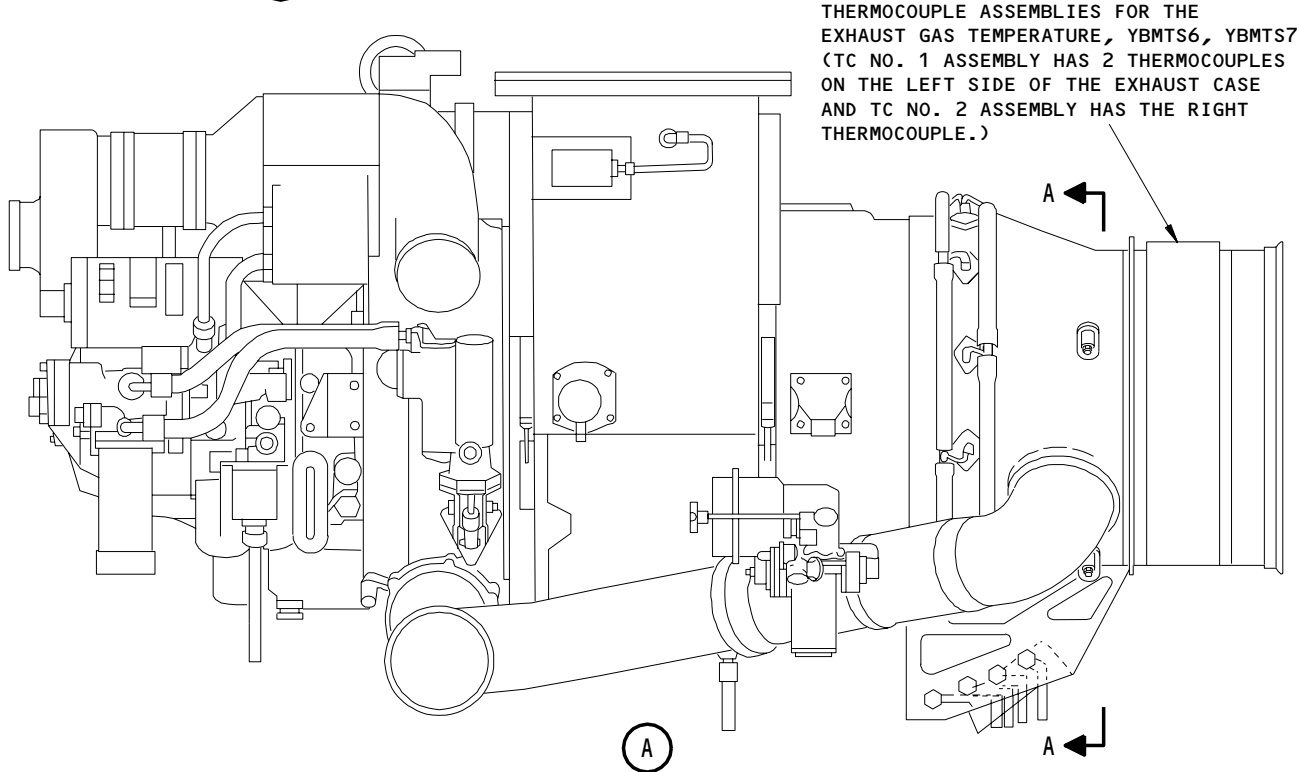
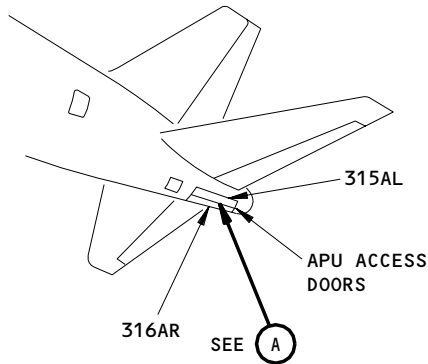


49-71-00

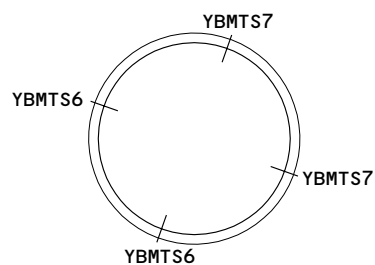
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Page 101  
Aug 10/94

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THERMOCOUPLE ASSEMBLIES FOR THE EXHAUST GAS TEMPERATURE, YBMTS6, YBMTS7 (TC NO. 1 ASSEMBLY HAS 2 THERMOCOUPLES ON THE LEFT SIDE OF THE EXHAUST CASE AND TC NO. 2 ASSEMBLY HAS THE RIGHT THERMOCOUPLE.)



(VIEW IN THE FORWARD DIRECTION)  
A-A

APU Exhaust Gas Temperature Indicating System - Component Location  
Figure 102

EFFECTIVITY	
	ALL

49-71-00



EXHAUST GAS TEMPERATURE THERMOCOUPLE -  
REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:  
(1) A removal of the Exhaust Gas Temperature (EGT) Thermocouple  
(2) An installation of the Exhaust Gas Temperature (EGT) Thermocouple.
- B. The EGT thermocouples are on the aft part of the APU. There are four thermocouples installed at equal distances around the exhaust housing. You can get access to the EGT thermocouples through the APU access doors.

TASK 49-71-01-004-001

2. Exhaust Gas Temperature Thermocouple Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:  
(a) P11 Overhead Panel  
1) 11B35, APU ALTN CONT

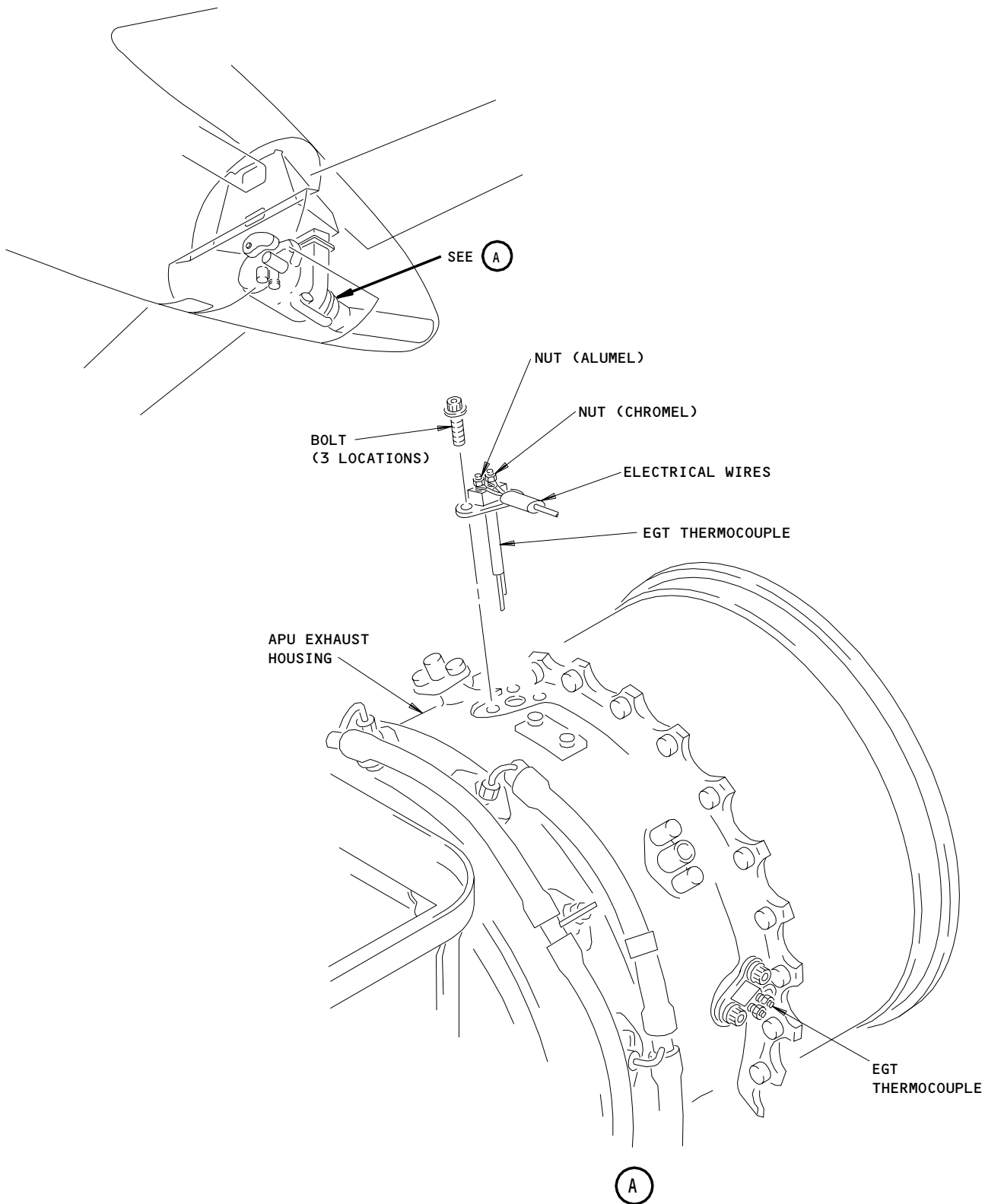
EFFECTIVITY

ALL

49-71-01

01

Page 401  
Aug 22/01



Exhaust Gas Temperature Thermocouple Installation  
Figure 401

EFFECTIVITY	
	ALL

49-71-01

01

Page 402  
Apr 22/99

18907

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

- (4) Remove the EGT thermocouple:
  - (a) Remove the nuts and the electrical wires from the EGT thermocouple.
  - (b) Remove the three bolts that attach the EGT thermocouple to the APU.
  - (c) Remove the EGT thermocouple from the APU.

TASK 49-71-01-404-006

3. Exhaust Gas Temperature Thermocouple Installation (Fig. 401)

A. References

- (1) AMM 49-61-05/201, APU Control Unit

EFFECTIVITY

ALL

49-71-01

03

Page 403  
Aug 22/05

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Exhaust Gas Temperature Thermocouple	49-71-01	01	50

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 424-007

(1) Install the EGT thermocouple:

- (a) Install the thermocouple in the exhaust housing with the three bolts.
  - 1) Tighten the bolts to 50-55 inch-pounds (5.7-6.2 newton-meters).

**CAUTION:** MAKE SURE YOU CORRECTLY CONNECT THE ELECTRICAL WIRES TO THE EGT THERMOCOUPLE. AN INCORRECT CONNECTION CAN CAUSE THE INCORRECT OPERATION OF THE APU.

- (b) Connect the electrical wires to the EGT thermocouple with the two nuts.
  - 1) Tighten the chromel nut to 15-17 inch-pounds (1.7-1.9 newton-meters).
  - 2) Tighten the alumel nut to 25-27 inch-pounds (2.8-3.1 newton-meters).

S 734-008

- (2) Do this task: APU Control Unit - Self Test (AMM 49-61-05/201).

EFFECTIVITY

ALL

49-71-01

01

Page 404  
Aug 22/05

S 414-009

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:

(a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

(b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

(c) Lift the left access door until the two APU access doors are approximately aligned.

(d) Close the two APU access doors.

(e) Close the four latches on the right access door.

S 864-010

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

(a) P49 APU Auxiliary Panel

1) 49C2, APU PRIME CONT

2) 49C3, APU START

(b) P11 Overhead Panel

1) 11B35, APU ALTN CONT

S 864-011

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-71-01

03

Page 405  
Aug 22/05

EXHAUST GAS TEMPERATURE THERMOCOUPLE -  
INSPECTION/CHECK

1. General

- A. This procedure contains this task:
  - (1) An inspection of the exhaust gas temperature (EGT) thermocouple.
- B. The EGT thermocouples are on the aft part of the APU. There are four thermocouples installed at equal distances around the exhaust housing. You can get access to the EGT thermocouples through the APU access doors.

TASK 49-71-01-206-012

2. Exhaust Gas Temperature Thermocouples Inspection

A. References

- (1) AMM 49-71-01/401, Exhaust Gas Temperature Thermocouple

B. Standard Tools and Equipment

- (1) Magnifying Glass - 7X-10X Magnification
- (2) Multimeter

C. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

D. Procedure

S 026-017

- (1) If it is installed, do this task: Exhaust Gas Temperature Thermocouple Removal (AMM 49-71-01/401).

S 216-014

- (2) Visually examine the EGT thermocouple:
  - (a) Use the magnifying glass to examine the thermocouple mounting flange for cracks and broken welds.
  - (b) Examine the EGT thermocouple for a tight fit between the thermocouple probes and the thermocouple housing.

S 976-015

- (3) Use the multimeter to measure the loop resistance across the chromel and the alumel terminals.
  - (a) The resistance must not be more than 0.5 ohms at a temperature of 77°F ± 20°F (25°C ± 11.1°C).

S 426-018

- (4) Do this task: Exhaust Gas Temperature Thermocouple Installation (AMM 49-71-01/401).

EFFECTIVITY

ALL

49-71-01

01

Page 601  
Dec 22/07

EXHAUST GAS TEMPERATURE THERMOCOUPLE – REPAIR

1. General

- A. This procedure contains this task:
  - (1) A repair of the exhaust gas temperature (EGT) thermocouple.
- B. The EGT thermocouples are on the aft part of the APU. There are four thermocouples installed at equal distances around the exhaust housing. You can get access to the EGT thermocouples through the APU access doors.

TASK 49-71-01-208-001

2. Exhaust Gas Temperature Thermocouples Repair (Fig. 801)

A. References

- (1) AMM 49-71-01/401, Exhaust Gas Temperature Thermocouple
- (2) SWPM 20-00-11/101, Materials
- (3) SWPM 20-10-11/101, Wiring Assembly Installation and Configuration
- (4) SWPM 20-10-13/101, Repair of Electrical Wire and Cable

B. Special Tools and Equipment

- (1) 525693 or 49935 Crimp – Hand  
Tyco Electronics Corporation  
449 Eisenhower Boulevard Harrisburg, PA 17111-2302

C. Consumables

- (1) B00130 Alcohol – Isopropyl

D. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
801		Splice	49-14-00	05	738

E. Access

- (1) Location Zones
  - 315 APU Compartment – Left
  - 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right

F. Procedure

S 028-002

- (1) Do this task: Exhaust Gas Temperature Thermocouple Removal (AMM 49-71-01/401).

EFFECTIVITY

ALL

**49-71-01**

01

Page 801  
Aug 22/08

- S 358-006
- (2) Determine length and smallest diameter of temperature grade D heat shrinkable sleeve required for splice (SWPM 20-10-13/101).
- (a) Cut the heat shrinkable sleeve to allow for 0.50 inch (13.0 mm) overlap on both ends of the splice.
- S 358-007
- (3) Remove the damaged length of wire.
- S 168-008
- (4) Clean the insulation a minimum of 3.0 inch (76.0 mm) from each end with isopropyl alcohol.
- S 358-009
- (5) Place the heat shrinkable sleeve over the wire.
- S 358-010
- (6) Remove 0.30 inch (8.0 mm) of insulation from each end of the wire.
- S 358-011
- (7) Insert the wire into the splice until it stops.
- S 358-012
- (8) Crimp the splice.
- S 358-014
- (9) Place two layers of temperature grade D, TFE tape or film strip over the splice assembly (SWPM 20-10-13/101).
- (a) Make sure each layer extends a minimum of 0.38 inch (10.0 mm) from each end of the splice, the tape makes a 50 percent overlap, and the second layer is wound in the opposite direction of the first layer.
- S 358-015
- (10) Assemble a temperature grade D lacing tape wire harness tie at each end and the middle of the tape over the splice assembly (SWPM 20-10-11/101).

EFFECTIVITY

ALL

49-71-01

01

Page 802  
Dec 22/08



S 358-016

- (11) Align the center of the heat shrinkable sleeve with the center of the splice assembly.

S 358-017

- (12) Assemble a temperature grade D lacing tape wire harness tie at each end and the middle of the heat shrinkable sleeve (SWPM 20-10-11/101).

S 428-005

- (13) Do this task: Exhaust Gas Temperature Thermocouple Installation (AMM 49-71-01/401).

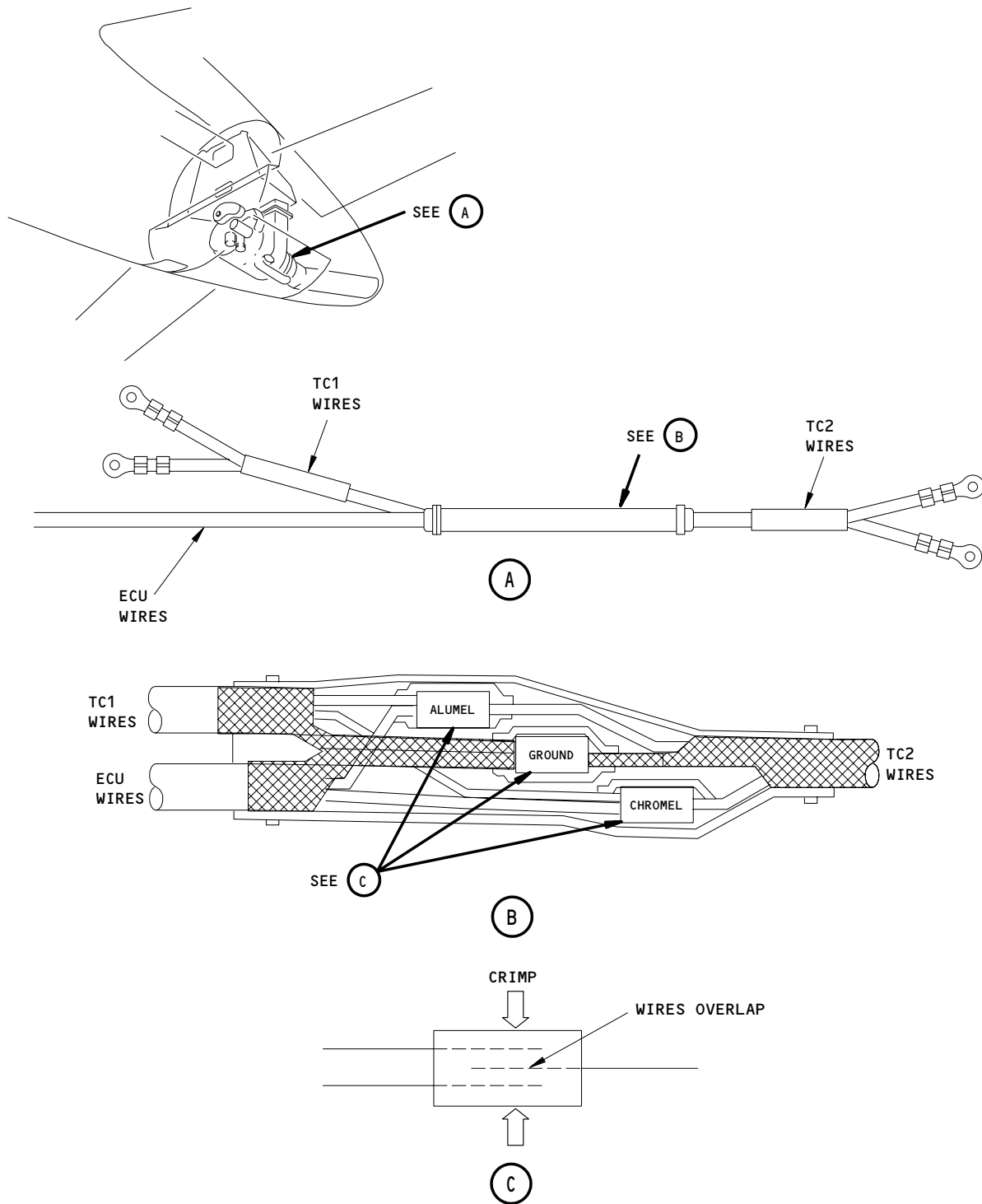
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ALL

**49-71-01**

01

Page 803  
Dec 22/08



Exhaust Gas Temperature Thermocouple Repair  
Figure 801

EFFECTIVITY	ALL
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49-71-01

01

Page 804  
Aug 22/07

APU INDICATING SYSTEM - DESCRIPTION AND OPERATION

1. General

- A. The hourmeter records the cumulative time of APU operation on a digital display.
- (1) The hourmeter is basically an electric clock enclosed in a hermetically sealed case. The hourmeter is located on the right side panel P61.
  - (2) SAS 150-161, 275-999;  
The hourmeter starts to measure APU operating time when the master control switch is turned to START/ON. The meter continues to measure time until the APU is shutdown.
  - (3) SAS 050-149, 162-274;  
The hourmeter starts to measure time when it receives a ground when the APU operates at faster than 95% speed. The hourmeter continues to measure time until the APU is shutdown.
- B. For more details on the APU indicating system, refer to these wiring diagrams and functional schematics:
- WDM 49-41-11: Auxiliary Power Unit Starter
  - WDM 49-72-11: Auxiliary Power Unit Hourmeter System
  - SSM 49-00-04: Auxiliary Power Unit Ignition and Starting.

EFFECTIVITY

ALL

49-72-00

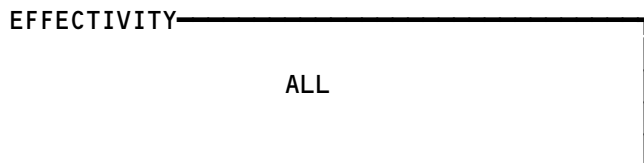
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FAULT ISOLATION/MAINT MANUAL

APU INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
HOURLMETER, N109	--	1	FLT COMPT, P61	49-72-01

\* SEE THE WDM EQUIPMENT LIST

APU Indicating System - Component Index  
Figure 101



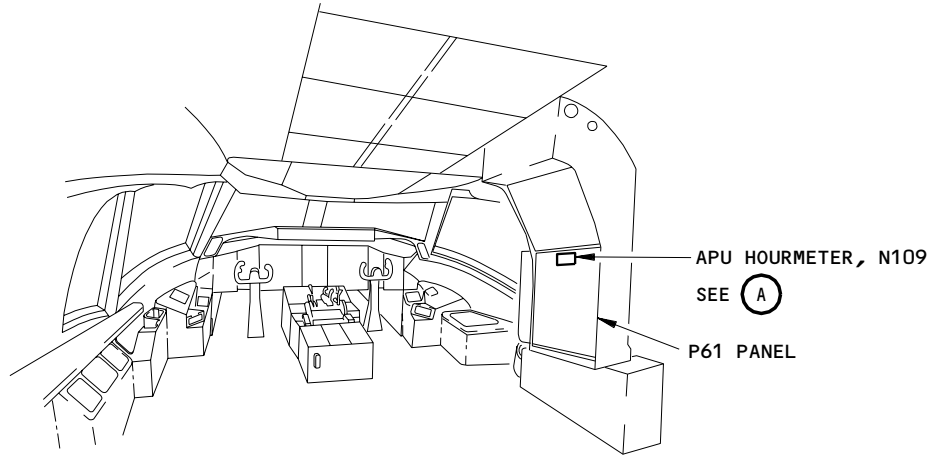
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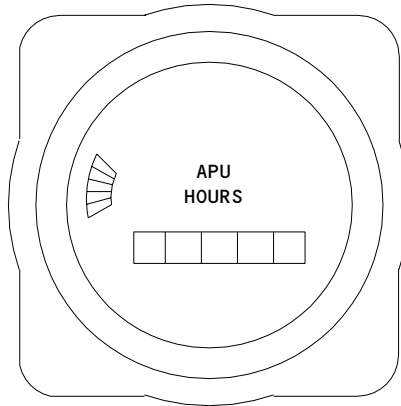
Page 101  
Aug 22/03

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 767  
 FAULT ISOLATION/MAINT MANUAL



FLIGHT COMPARTMENT



APU HOURMETER, N109

(A)

APU Indicating System - Component Location  
 Figure 102

EFFECTIVITY	ALL
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49-72-00

APU TIME TOTALIZER – REMOVAL/INSTALLATION

1. General

- A. This procedure has these tasks:
  - (1) A removal of the APU time totalizer
  - (2) An installation of the APU time totalizer.
- B. The APU time totalizer is installed in the P61 panel.
- C. The APU time totalizer is referred to as the APU hourmeter.

TASK 49-72-01-004-001

2. APU Time Totalizer Removal (Fig. 401)

A. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right

(2) Access Panels

- 822 Aft Cargo Door

B. Prepare for the Removal

S 864-012

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-013

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

C. APU Time Totalizer Removal

S 024-015

- (1) Do these steps to remove the APU hourmeter:
  - (a) Remove the four screws that attach the APU hourmeter to the panel.
  - (b) Carefully pull the APU hourmeter until you can get access to the two wire terminals.
  - (c) Remove the two screws and two washers that attach the two wire terminals to the APU hourmeter.

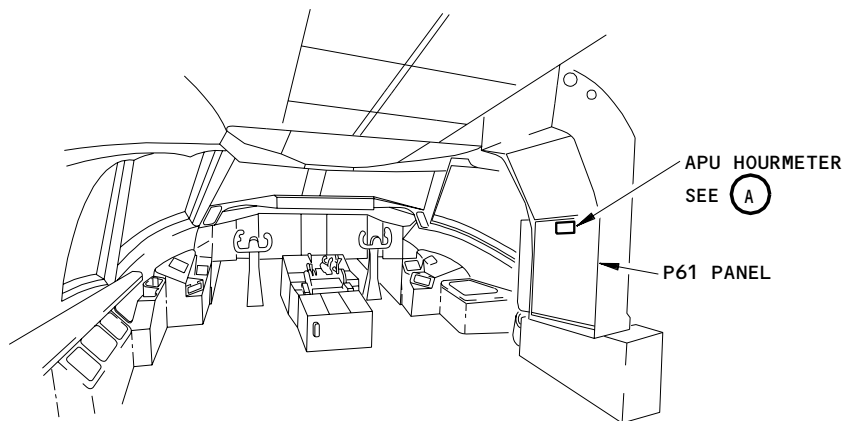
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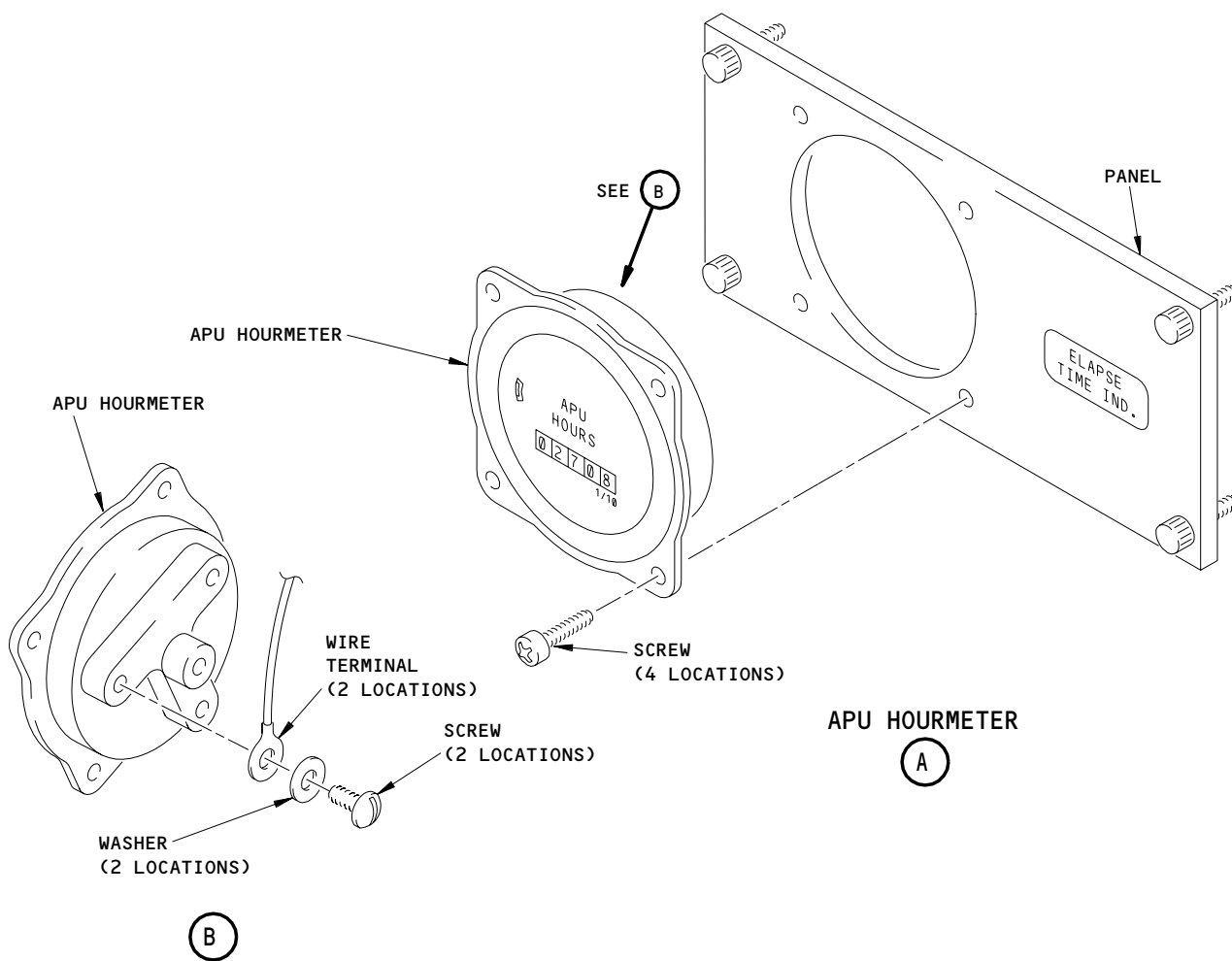
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05

Page 401  
Aug 22/03



FLIGHT COMPARTMENT



APU Time Totalizer (APU Hourmeter) Installation  
Figure 401

EFFECTIVITY	
	ALL

49-72-01

01

Page 402  
Aug 22/03

(d) Write down the APU HOURS from the APU hourmeter indication.

**NOTE:** You cannot set the new APU hourmeter with the APU hours. It is recommended that you keep a written record of the APU hours.

TASK 49-72-01-404-030

3. APU Time Totalizer Installation (Fig. 401)

A. References

(1) AMM 49-11-00/201, Auxiliary Power Unit

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		APU Time Totalizer (APU Hourmeter) (P61)	49-72-01	01	10 or
				02	10, 15, 20, 25 or 105 or
				02A	10 or
				03	10 or 20 or
				04	25 or 45 or
				04A	15 or
		APU Time Totalizer (APU Hourmeter) (E6)	49-72-51	01	55 or
				01B	15 or 120 or
				01C	15

C. Access

(1) Location Zones

154 Aft Cargo Compartment - Right  
211 Flight Compartment - Left  
212 Flight Compartment - Right

(2) Access Panels

822 Aft Cargo Door

D. Procedure

S 424-019

(1) Do these steps to install the APU hourmeter:

- (a) Install the two washers and two screws that attach the two wire terminals to the APU hourmeter.
- (b) Carefully install the APU hourmeter.

EFFECTIVITY

ALL

**49-72-01**

01

Page 403  
Aug 22/05



(c) Install the four screws that attach the APU hourmeter to the panel.

E. APU Time Totalizer Installation Test

S 864-020

- (1) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
- (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START

S 864-022

- (2) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 714-031

- (3) Do the installation test for the APU hourmeter:
- (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) Operate the APU for a minimum of six minutes.
  - (c) Look at the APU HOURS indication on the APU hourmeter.
  - (d) The APU HOURS indication must increase by one on the 1/10 counter.
  - (e) If it is not necessary to do other tasks, do this task: APU Shutdown Procedure (AMM 49-11-00/201).

EFFECTIVITY

ALL

49-72-01

05

Page 404  
Aug 22/05

APU TACHOMETER SYSTEM – DESCRIPTION AND OPERATION

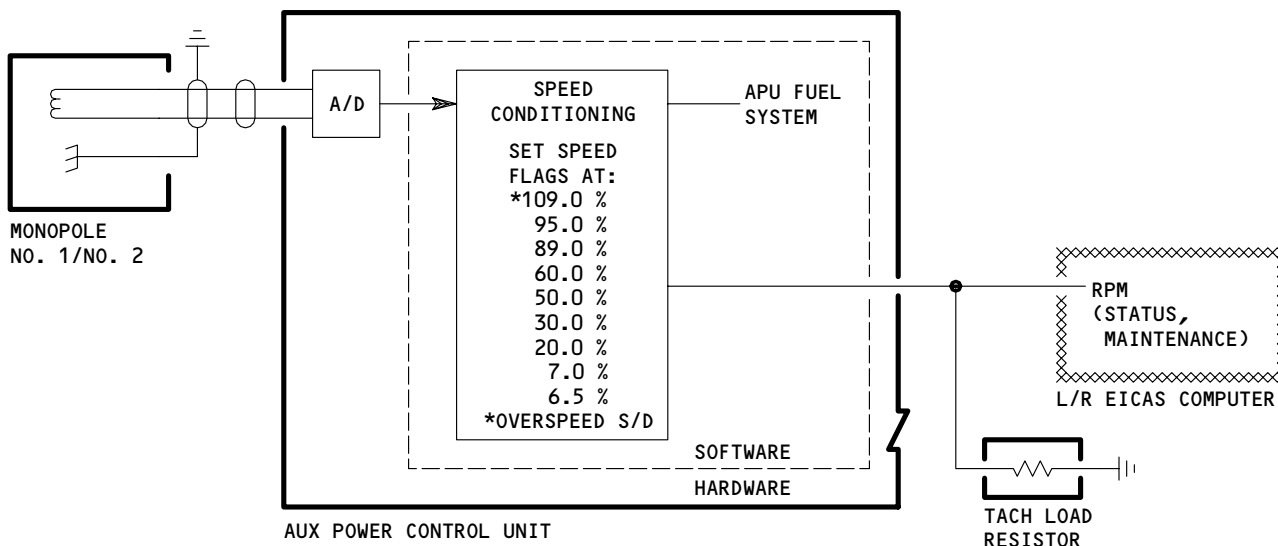
1. General

A. The tachometer system measures APU speed and provides speed indication in the flight compartment. The system consists of two speed sensing transducers (monopoles), APU control unit, and EICAS RPM indication. Power for the system is 28 volts dc supplied from the main battery bus.

2. Operation

A. Functional Description (Fig. 1)

- (1) The two monopoles located on each side of the compressor inlet plenum convert mechanical motion into an electrical signal. A ferromagnetic nut on the rotating drive shaft passes through the magnetic fields of the monopoles, generating electrical signals.
- (2) During acceleration, the APU control unit compares the higher speed signal to a speed schedule. A current signal is supplied to the torque motor for the fuel control to achieve the required speed.
- (3) The control unit provides normal and redundant overspeed shutdowns. Normal overspeed shutdown occurs when 107 percent rpm is exceeded for 0.025 seconds. Redundant overspeed shutdown occurs when 109 percent rpm is exceeded for 0.02 seconds.
- (4) The higher RPM signal is supplied to EICAS where it is displayed in the maintenance and status modes. EICAS rpm indication displays APU speed in percent of APU rated speed.



APU Tachometer System Schematic  
Figure 1

EFFECTIVITY  
ALL

49-73-00

B. BITE

- (1) The APU control unit monitors tachometer system operation, tests component circuits, and writes any faults in BITE memory (AMM 49-61-00/001). A failure of the ECU or the monopoles is shown in the FAULTY LRU matrix as ECU, #1 SPD SENSOR or #2 SPD SENSOR. An automatic shutdown because of OVERSPEED, UNDERSPEED or START ABORTED is shown in the REASON APU NOT OPERATING matrix.

EFFECTIVITY

ALL

49-73-00

10

Page 2  
Nov 10/95

APU EXHAUST SYSTEM - DESCRIPTION AND OPERATION

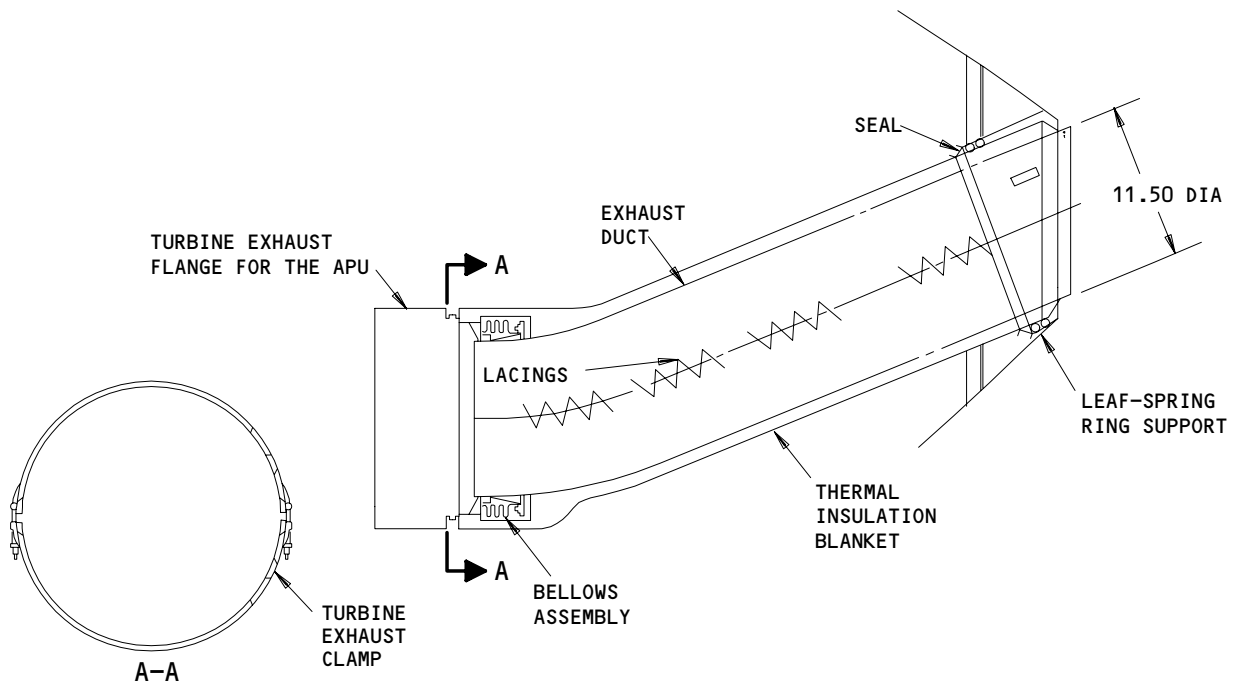
1. General

A. The APU exhaust system conveys APU exhaust gas from the airplane. The system consists of an exhaust duct, an insulation blanket, and exhaust duct supports.

2. Component Details

A. Exhaust Duct (Fig. 1)

(1) The APU exhaust duct carries exhaust from APU out through airplane tail cone. It also provides a thermal barrier to shield the APU compartment from exhaust gases and reduces exhaust noise level.



APU Exhaust System  
Figure 1

EFFECTIVITY	
	ALL

**49-81-00**

01

Page 1  
May 10/96

- B. Exhaust Duct Insulation Blanket (Fig. 1)  
(1) A thermal insulation blanket (in two sections) is wrapped around the outside of the exhaust duct and retained by lacings. The blanket has sealed surfaces to prevent absorption of fluids.
- C. Exhaust Duct Supports (Fig. 1)  
(1) A V-band clamp attaches the exhaust duct to the turbine exhaust flange of the APU. A bellows assembly allows relative movement and thermal expansion between the APU and the exhaust duct. The aft end of the exhaust duct is supported and sealed by a leaf-spring ring support. The ring support, which fits around the end of the exhaust duct, is attached to the tail cone assembly that you can remove.

EFFECTIVITY

ALL

49-81-00

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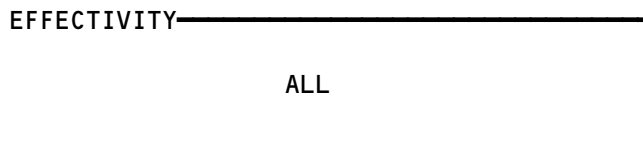
Page 2  
Dec 22/05


**BOEING**  
 767  
 FAULT ISOLATION/MAINT MANUAL

APU EXHAUST SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
BLANKET - EXHAUST DUCT INSULATION	--	1	316AR, 315AL, APU COMPT	49-81-02
DUCT - EXHAUST	--	1	316AR, 315AL, APU COMPT	49-81-01
SEAL - EXHAUST DUCT SUPPORT	--	1	316AR, 315AL, APU COMPT	49-81-03

APU Exhaust System - Component Index  
Figure 101

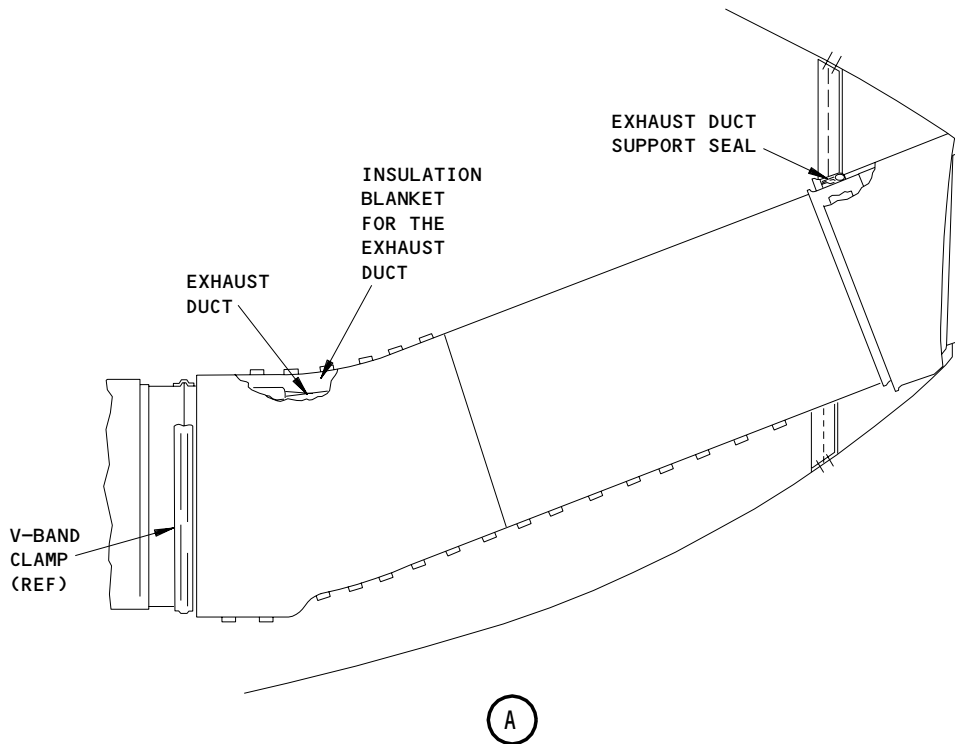
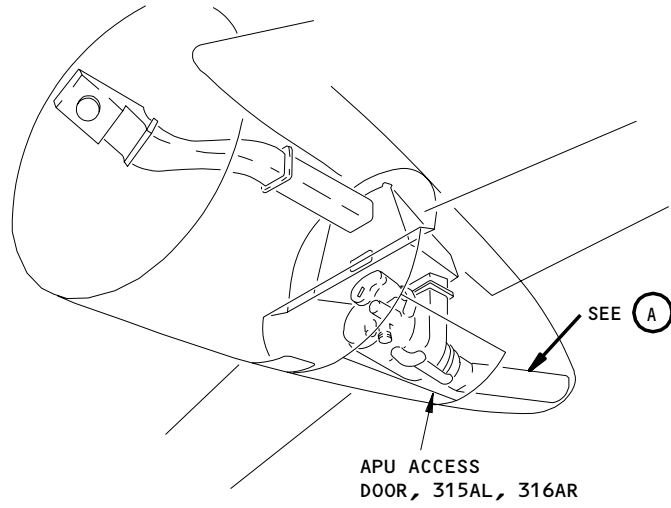


49-81-00

02

Page 101  
Apr 22/99

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APU Exhaust System - Component Location  
 Figure 102

EFFECTIVITY	ALL
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49-81-00

EXHAUST DUCT - REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the Exhaust Duct
  - (2) An installation of the Exhaust Duct.
- B. The exhaust duct moves the APU exhaust out through the airplane tail cone. There is a support ring in the tail cone assembly that holds the aft end of the exhaust duct.
- C. You must remove the tail cone assembly to make an opening for the exhaust duct removal. The forward end of the exhaust duct connects to the APU with a V-band clamp.
- D. You can get access to the exhaust duct through the APU access doors and on the outer side of the APU compartment.

TASK 49-81-01-004-001

2. Exhaust Duct Removal (Fig. 401)

- A. References
  - (1) AMM 49-81-02/401, Exhaust Duct Insulation Blanket

- B. Access

- (1) Location Zones
  - 154 Aft Cargo Compartment - Right
  - 211 Flight Compartment - Left
  - 212 Flight Compartment - Right
  - 315 APU Compartment - Left
  - 316 APU Compartment - Right

- (2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

- C. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

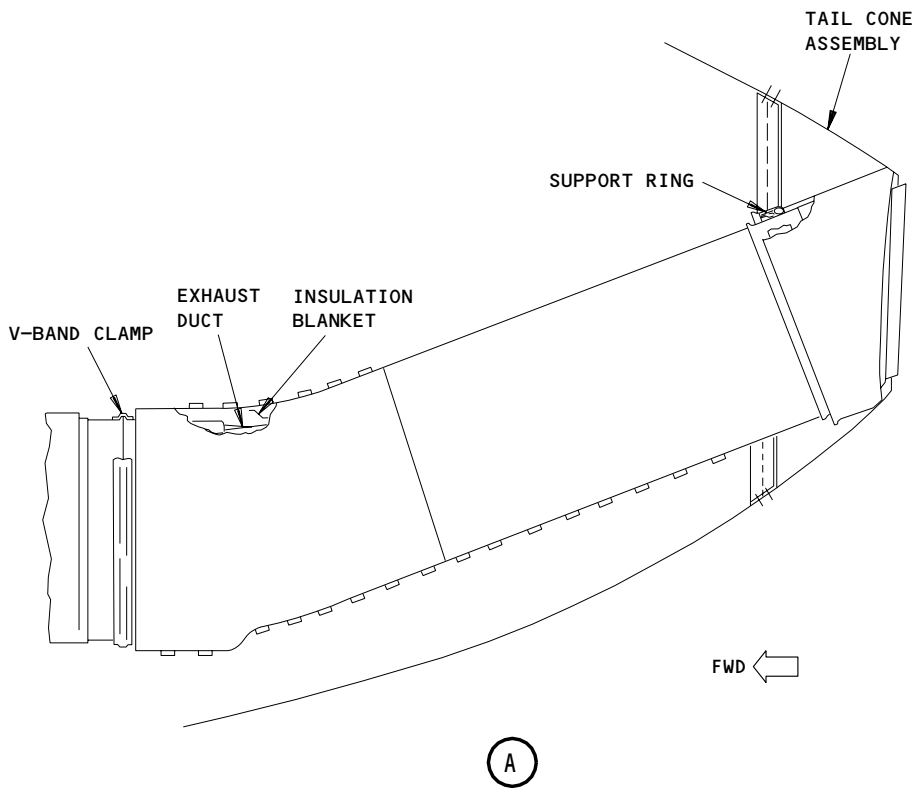
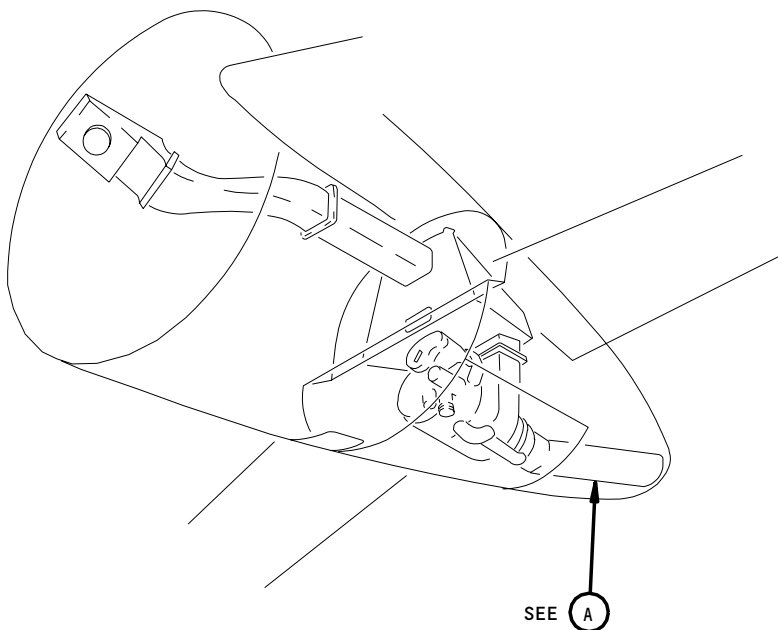
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49-81-01

01

Page 401  
Aug 22/01





Exhaust Duct Installation  
Figure 401

EFFECTIVITY	ALL
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49-81-01

01

Page 402  
Apr 22/99

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-022

- (4) Remove the tail cone assembly:
  - (a) Remove the bolts that attach the tail cone assembly to the fuselage.
  - (b) Remove the tail cone assembly from the fuselage.

S 024-006

- (5) Remove the exhaust duct:
  - (a) Hold the aft end of the exhaust duct.
  - (b) Remove the V-band clamp that attaches the forward end of the exhaust duct to the APU.

WARNING: BE CAREFUL WHEN YOU MOVE THE APU EXHAUST DUCT. THE APU EXHAUST DUCT WEIGHS APPROXIMATELY 60 POUNDS (27.3 KILOGRAMS). INJURY TO PERSONS CAN OCCUR.

CAUTION: KEEP THE INSULATION BLANKET AWAY FROM SHARP OBJECTS. YOU CAN CAUSE DAMAGE TO THE INSULATION BLANKET WITH SHARP OBJECTS.

- (c) Carefully remove the exhaust duct through the aft tail opening.

EFFECTIVITY

ALL

49-81-01

04

Page 403  
Dec 22/04

S 034-007

- (6) If it is necessary, do this task: Exhaust Duct Insulation Blanket Removal (AMM 49-81-02/401).

TASK 49-81-01-404-008

3. Exhaust Duct Installation (Fig. 401)

A. References

- (1) AMM 49-81-02/401, Exhaust Duct Insulation Blanket

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Exhaust Duct	49-81-01	01 05	5 or 55 or 5, 50, 60, 63, 105 or 120

C. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

D. Procedure

S 434-009

- (1) If it is not installed, do this task: Exhaust Duct Insulation Blanket Installation (AMM 49-81-02/401).

S 424-010

- (2) Install the exhaust duct:

EFFECTIVITY

ALL

**49-81-01**

01

Page 404  
Aug 22/05

**WARNING:** BE CAREFUL WHEN YOU MOVE THE APU EXHAUST DUCT. THE APU EXHAUST DUCT WEIGHS APPROXIMATELY 60 POUNDS (27.3 KILOGRAMS). INJURY TO PERSONS CAN OCCUR.

**CAUTION:** KEEP THE INSULATION BLANKET AWAY FROM SHARP OBJECTS. YOU CAN CAUSE DAMAGE TO THE INSULATION BLANKET WITH SHARP OBJECTS.

- (a) Carefully install the exhaust duct through the aft tail opening.
- (b) Hold the forward end of the exhaust duct adjacent to the APU.
- (c) Put the tail cone assembly in its position on the fuselage.
- (d) Install the bolts that attach the tail cone assembly to the fuselage.
- (e) Put the V-band that attaches the exhaust duct to the APU in its position.
  - 1) Tighten the clamp to 70-90 inch-pounds (7.9-10.2 newton-meters).

S 414-011

- (3) Close the left APU access door, 315AL, and right APU access door, 316AR:

- (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 864-012

- (4) Remove the DO-NOT-CLOSE tags and close these circuit breakers:

- (a) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START
- (b) P11 Overhead Panel
  - 1) 11B35, APU ALTN CONT

S 864-013

- (5) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-81-01

03

Page 405  
Aug 22/05

EXHAUST DUCT – INSPECTION/CHECK

1. General

- A. This procedure contains this task:
  - (1) A inspection of the Exhaust Duct.
- B. The exhaust duct moves the APU exhaust out through the airplane tail cone. There is a support ring in the tail cone assembly that holds the aft end of the exhaust duct.
- C. You must remove the tail cone assembly to make an opening for the exhaust duct removal. The forward end of the exhaust duct connects to the APU with a V-band clamp.
- D. You can get access to the exhaust duct through the APU access doors and on the outer side of the APU compartment.

TASK 49-81-01-206-014

2. Exhaust Duct Inspection

A. References

- (1) AMM 49-81-01/401, Exhaust Duct
- (2) AMM 49-81-02/401, Exhaust Duct Insulation Blanket
- (3) AMM 49-81-03/401, Exhaust Duct Support Seal

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment – Right
- 211 Flight Compartment – Left
- 212 Flight Compartment – Right
- 315 APU Compartment – Left
- 316 APU Compartment – Right

(2) Access Panels

- 315AL APU Access Door – Left
- 316AR APU Access Door – Right
- 822 Aft Cargo Door

C. Procedure

S 866-015

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 866-016

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

49-81-01

01

Page 601  
Aug 22/01

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 016-017

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 216-018

- (4) Do these steps to inspect the exhaust duct in the APU compartment:

- (a) Make sure the V-band clamp is correctly installed and tight.
- (b) Visually examine the insulation blanket for burns, holes and tears.
  - 1) If you find burns, holes or tears, replace the insulation blanket (AMM 49-81-02/401).

EFFECTIVITY

ALL

49-81-01

04

Page 602  
Aug 22/01

- (c) Visually examine the exhaust duct lacings on the insulation blanket to make sure each lacing is not broken.
  - 1) Repair the lacing(s) if there are broken (AMM 49-81-02/401).

S 216-022

- (5) Do these steps to inspect the exhaust duct from outside the airplane or if the APU was removed from the APU compartment:
  - (a) Examine the exhaust duct bellows for cracks, burns or missing parts.
    - 1) If you find cracks, burns or missing parts on the exhaust duct bellows, replace the exhaust duct (AMM 49-81-01/401).
  - (b) Use a flashlight to visually examine the support ring and seal on the exhaust duct support for damage, gaps or area(s) where the seal does not touch the exhaust duct.
    - 1) If you find damage to the seal, replace the exhaust duct support seal (AMM 49-81-03/401).
    - 2) If you see a gap(s) or area(s) where the seal does not touch the exhaust duct, repair the problems that you find (AMM 49-81-03/401).
  - (c) Visually examine the internal surfaces of the exhaust duct for cracks or burns.
    - 1) If you find cracks or burns, replace the exhaust duct (AMM 49-81-01/401).

S 416-019

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

**NOTE:** You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.
  - (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.

EFFECTIVITY

ALL

**49-81-01**

01

Page 603  
Aug 22/01

- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

S 866-020

- (7) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 866-021

- (8) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

EFFECTIVITY

ALL

49-81-01

04

Page 604  
Aug 22/01



EXHAUST DUCT INSULATION BLANKET – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the insulation blanket on the exhaust duct.
- B. You must remove the exhaust duct to remove the insulation blanket. You can get access to the exhaust duct through the APU access doors and on the outer side of the APU compartment.

TASK 49-81-02-004-001

2. Exhaust Duct Insulation Blanket Removal (Fig. 401)

- A. References
  - (1) AMM 49-81-01/401, Exhaust Duct
- B. Access
  - (1) Location Zones
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right

C. Procedure

S 014-002

- (1) Do this task: Exhaust Duct Removal (AMM 49-81-01/401).

S 024-004

**CAUTION:** BE CAREFUL WITH THE BLANKET. THE BLANKET CAN BE EASILY DAMAGED. DO NOT LET THE BLANKET TOUCH THE SHARP EDGES. DAMAGE TO THE BLANKET CAN OCCUR.

- (2) Remove the insulation blanket:

**NOTE:** The insulation blanket is in three parts, two forward and one aft.

- (a) Remove the lacing on the insulation blanket.

**NOTE:** The lacings on the forward part of the blanket are on the top and the bottom of the duct. The lacings on the aft part of the blanket are on the bottom of the duct only.

- (b) Remove the insulation blanket from the exhaust duct.

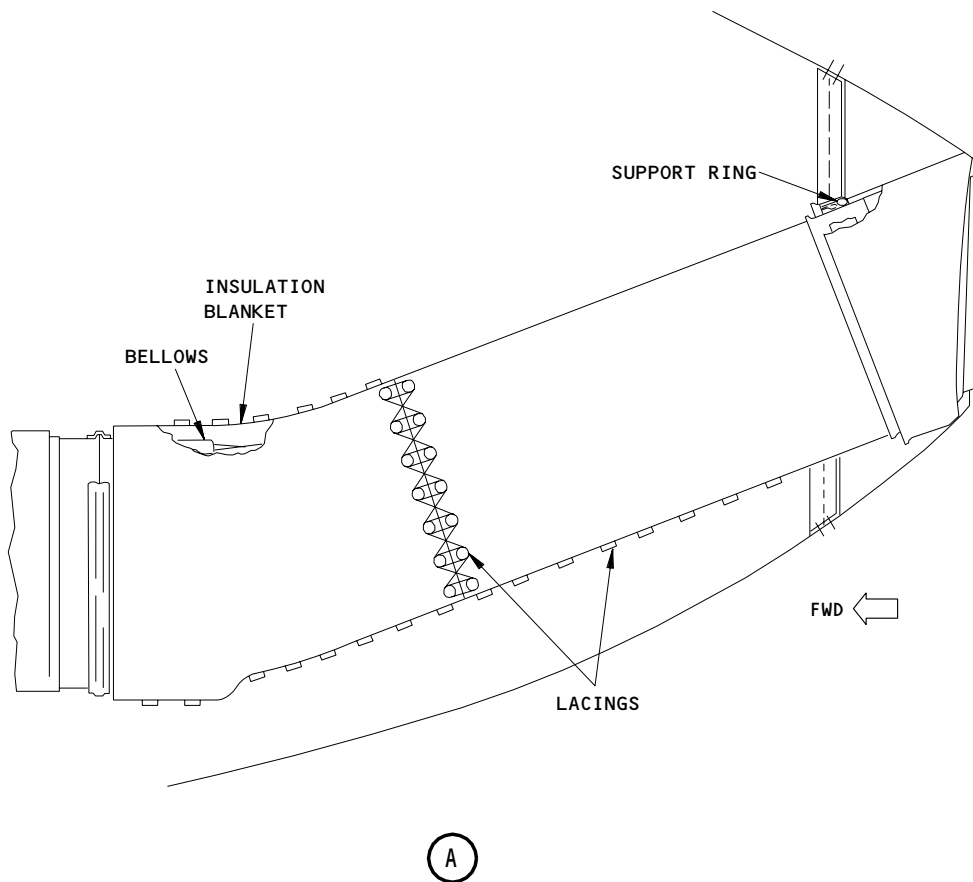
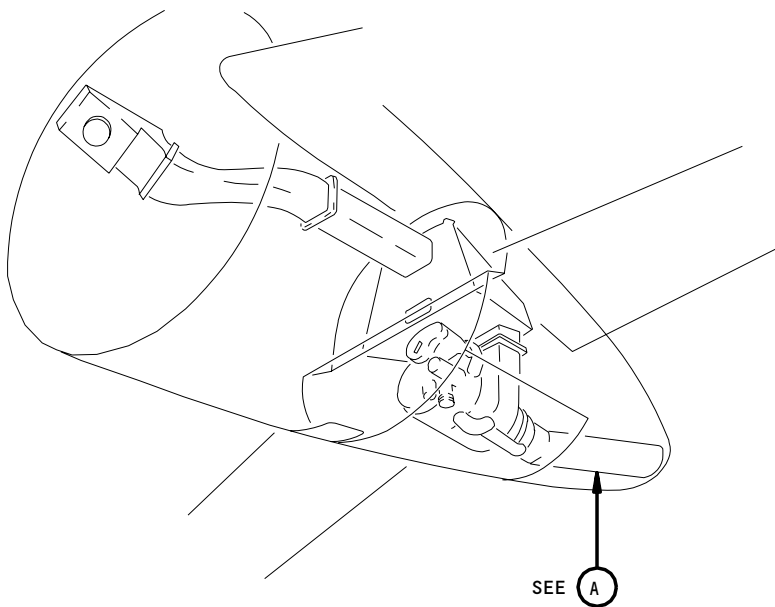
EFFECTIVITY

ALL

**49-81-02**

01

Page 401  
Aug 22/01



Exhaust Duct Insulation Blanket Installation  
Figure 401

EFFECTIVITY	ALL
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49-81-02

01

Page 402  
Apr 22/99

TASK 49-81-02-404-005

3. Exhaust Duct Insulation Blanket Installation (Fig. 401)

A. References

- (1) AMM 49-81-01/401, Exhaust Duct

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Insulation Blanket	49-81-01	01	10, 15 or 20 or
				05	10, 15, 20, 65, 70, 73, 75, 80, 83, 87 or 110

C. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

D. Procedure

S 424-006

**CAUTION:** BE CAREFUL WITH THE BLANKET. THE BLANKET CAN BE EASILY DAMAGED. DO NOT LET THE BLANKET TOUCH THE SHARP EDGES. DAMAGE TO THE BLANKET CAN OCCUR.

(1) Install the insulation blanket:

- (a) Put the insulation blanket in its position on the exhaust duct.

**NOTE:** The insulation blankets goes below the support ring assembly on the aft end of the exhaust duct.

- 1) Make sure you align the lacing studs along the top or the bottom of the duct.

EFFECTIVITY

ALL

**49-81-02**

01

Page 403  
Aug 22/05

CAUTION: DO NOT USE THE LACINGS TO MOVE THE INSULATION ENDS TOGETHER. DAMAGE TO THE LACING STUDS CAN OCCUR.

(b) While one person holds the insulation halves together, connect the lacings to attach the blanket to the exhaust duct.

S 414-007

(2) Do this task: Exhaust Duct Installation (AMM 49-81-01/401).

EFFECTIVITY

ALL

**49-81-02**

01

Page 404  
Aug 22/05

EXHAUST DUCT SUPPORT SEAL – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the support seal on the exhaust duct.
- B. The support ring for the exhaust duct holds the aft end of the exhaust duct. The support ring is part of the tail cone assembly on the airplane.
- C. You must remove the tail cone assembly from the airplane to remove the support ring. You can get access to the tail cone assembly and the support ring on the outer sides of the APU compartment.

TASK 49-81-03-004-001

2. Exhaust Duct Support Seal Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

822	Aft Cargo Door
-----	----------------

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

EFFECTIVITY

ALL

**49-81-03**

01

Page 401  
Aug 22/01

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 024-012

- (3) Remove the tail cone assembly:
  - (a) Remove the 24 bolts (4) and 24 washers (3) that attach the tail cone assembly to the fuselage.
  - (b) Remove the tail cone assembly from the fuselage.

S 024-005

- (4) Remove the support ring (1) from the tail cone assembly:
  - (a) Remove the 15 bolts (6) and 15 washers (5) from the inner side of the support ring (1) that attach the support ring to the support ring duct.

NOTE: The support ring (1) and support ring duct are part of the tail cone assembly.

- (b) Remove the support ring (1) and exhaust duct support seal (2) from the tail cone assembly.

TASK 49-81-03-404-006

3. Exhaust Duct Support Seal Installation (Fig. 401)

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Exhaust Duct Support Seal	49-81-03	01	30

B. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 822 Aft Cargo Door

C. Procedure

S 424-007

- (1) Install the support ring (1) in the tail cone assembly:
  - (a) Put the exhaust duct support seal (2) aft on the support ring (1).
  - (b) Install the support ring (1) in the tail cone assembly.

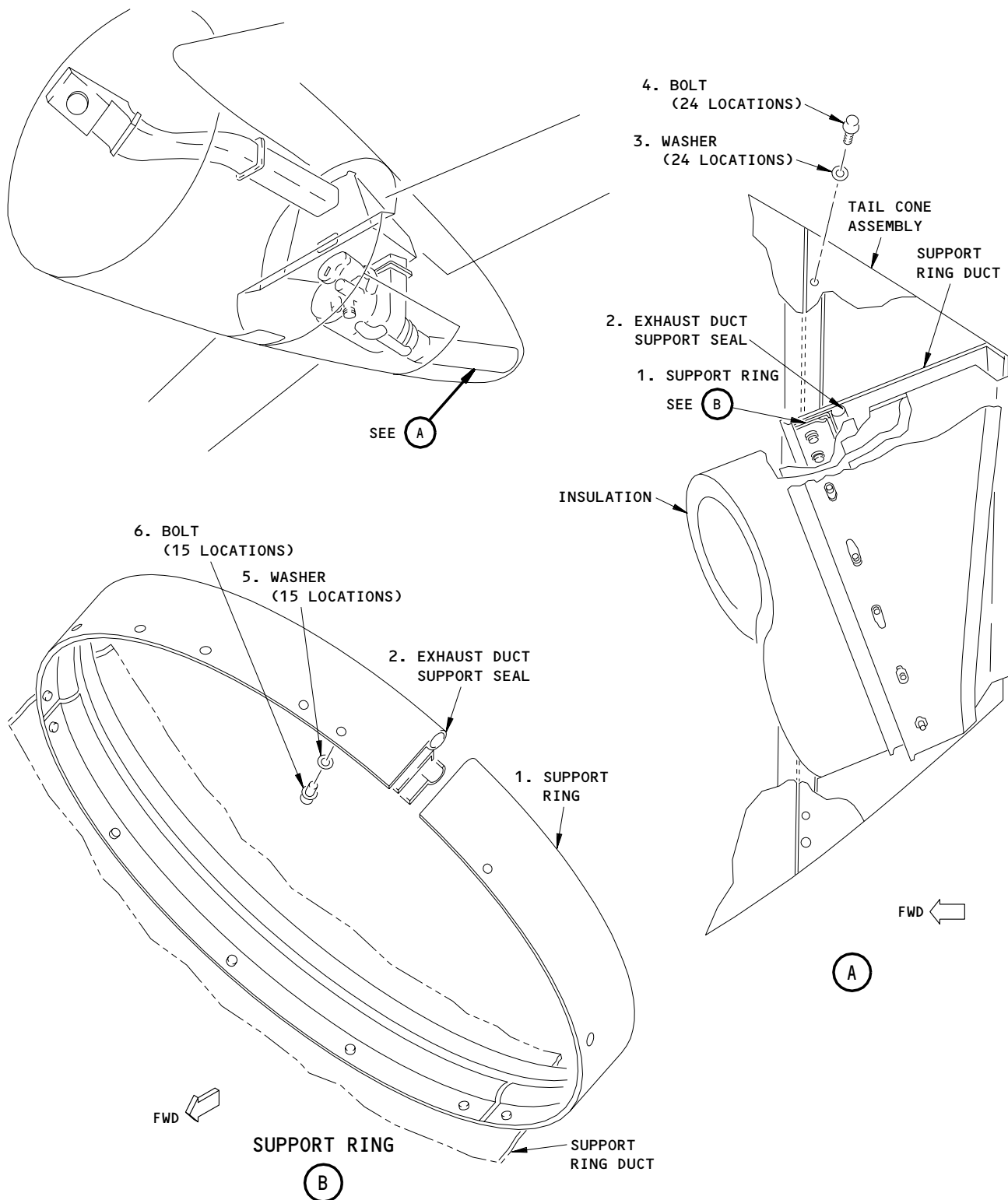
EFFECTIVITY

ALL

**49-81-03**

03

Page 402  
Aug 22/05



Exhaust Duct Support Seal Installation  
Figure 401

EFFECTIVITY

ALL

49-81-03

01

Page 403  
Dec 22/03

- (c) Align the bolt holes in the support ring (1) with the holes in the support ring duct.
- (d) Install the 15 washers (5) and 15 bolts (6) that attach the support ring (1) to the support ring duct.

S 424-013

- (2) Install the tail cone assembly:
  - (a) Put the tail cone assembly in its position on the fuselage.
  - (b) Align the holes in the tail cone assembly with the holes in the fuselage.
  - (c) Install the 24 washers (3) and 24 bolts (4) that attach the tail cone assembly to the fuselage.

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

EFFECTIVITY

ALL

49-81-03

03

Page 404  
Aug 22/05



APU OIL INDICATING SYSTEM – DESCRIPTION AND OPERATION

1. General (Fig. 1)
  - A. The APU oil indicating system monitors the engine lubrication system. The system consists of the oil temperature sensor, switch for the low oil pressure, differential pressure switch for the generator oil filter, and an oil quantity sensor. The oil indicating circuit obtains 28 volts dc for operation from the battery bus. The high oil temperature, low oil pressure, and the differential pressure circuits for the generator oil filter are part of the automatic shutdown circuit.
2. Component Details
  - A. Switch for the Low Oil Pressure (Fig. 2)
    - (1) The switch has four parts, which are the diaphragm, the bellville spring, the shunt disc, and the electrical connection. It is installed in a common housing with the oil temperature sensor on the casing of the APU load compressor. The control unit stops the APU when the switch signal is less than  $35 \pm 5$  psig for more than 15 seconds at speeds greater than 95 percent.
    - (2) An automatic shutdown because of low oil pressure is written in BITE memory (AMM 49-61-00/001) and is shown as LOW OIL PRESSURE on the REASON APU NOT OPERATING matrix. A failure of the switch is shown as LOP SWITCH on the FAULTY LRU matrix.
  - B. Differential Pressure Switch for the Generator Oil Filter (Fig. 2)
    - (1) The switch is installed in the housing for the generator scavenge filter. It has three parts, which are the shunt disc, the bellville spring, and the housing with an electrical connection. The switch monitors the differential pressure across the filter, which increases when the filter is clogged. The control unit stops the APU when it receives a signal for more than 0.5 second at speeds above 95 percent.
    - (2) An automatic shutdown because of a clogged filter is written in BITE memory (AMM 49-61-00/001) and is shown as GEN FILTER on the REASON APU NOT OPERATING matrix. A failure of the switch is shown as FILTER SW(GEN) on the FAULTY LRU matrix.
  - C. Oil Quantity Transmitter
    - (1) The transmitter consists of a magnet/float that triggers a series of magnetic proximity switches which gives a signal to EICAS. EICAS messages read "FULL", "0.75", "0.50", "0.25", and "ADD". The transmitter is installed through the bottom of the gearbox. When the quantity reaches "ADD" an additional EICAS "APU OIL QTY" message also appears.

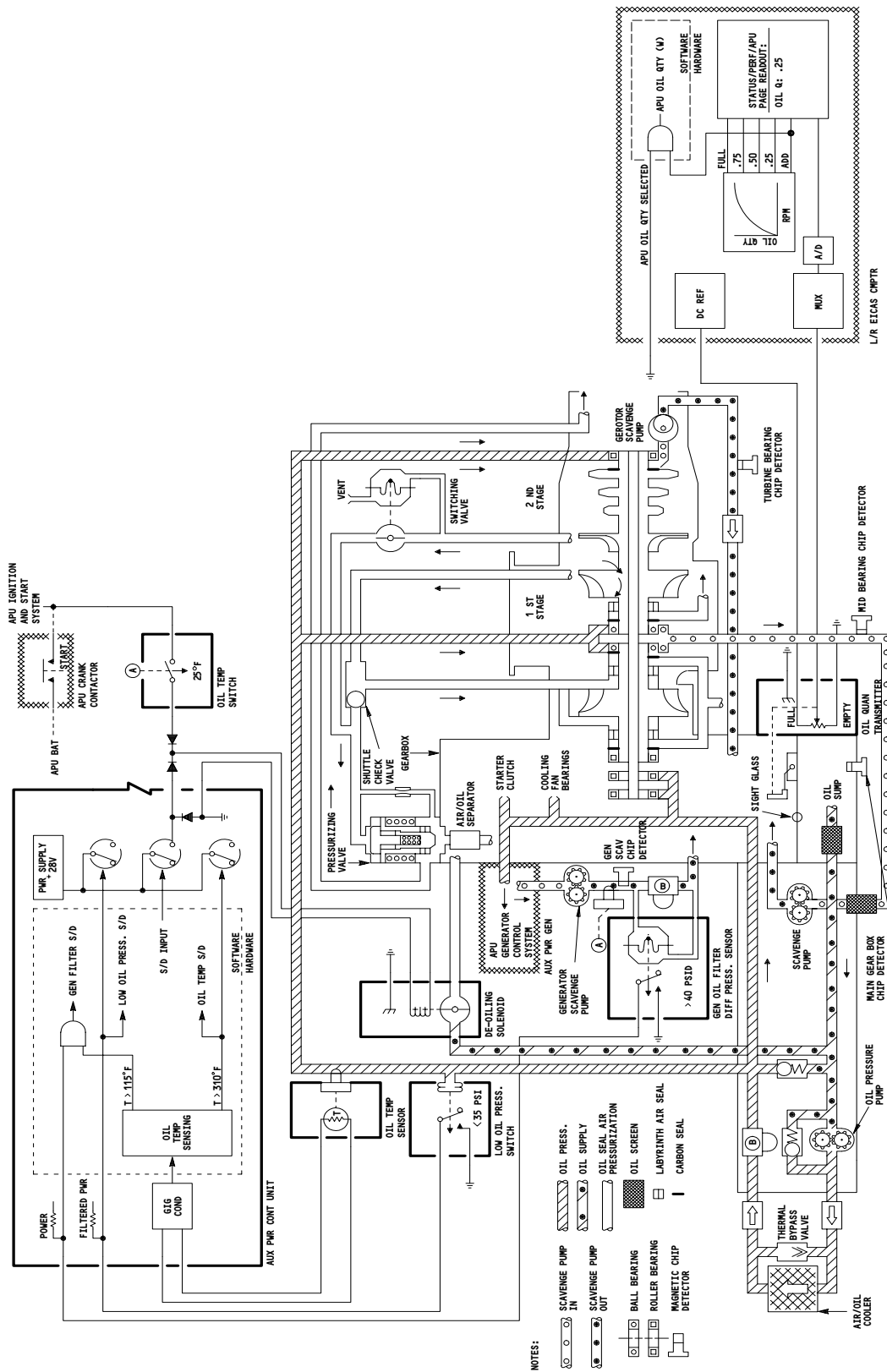
EFFECTIVITY

ALL

49-94-00

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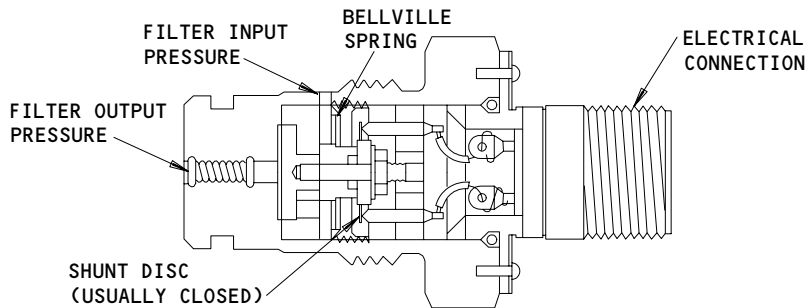
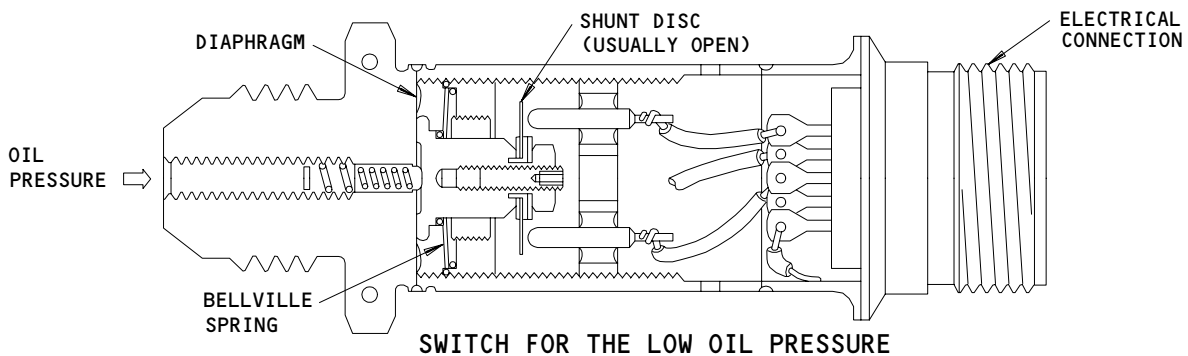
Page 1  
Dec 22/01



APU Oil Indicating System Schematic  
Figure 1

EFFECTIVITY  
ALL

49-94-00



**DIFFERENTIAL PRESSURE SWITCH FOR THE GENERATOR**

**APU Oil Pressure Switches  
Figure 2**

EFFECTIVITY ————  
ALL

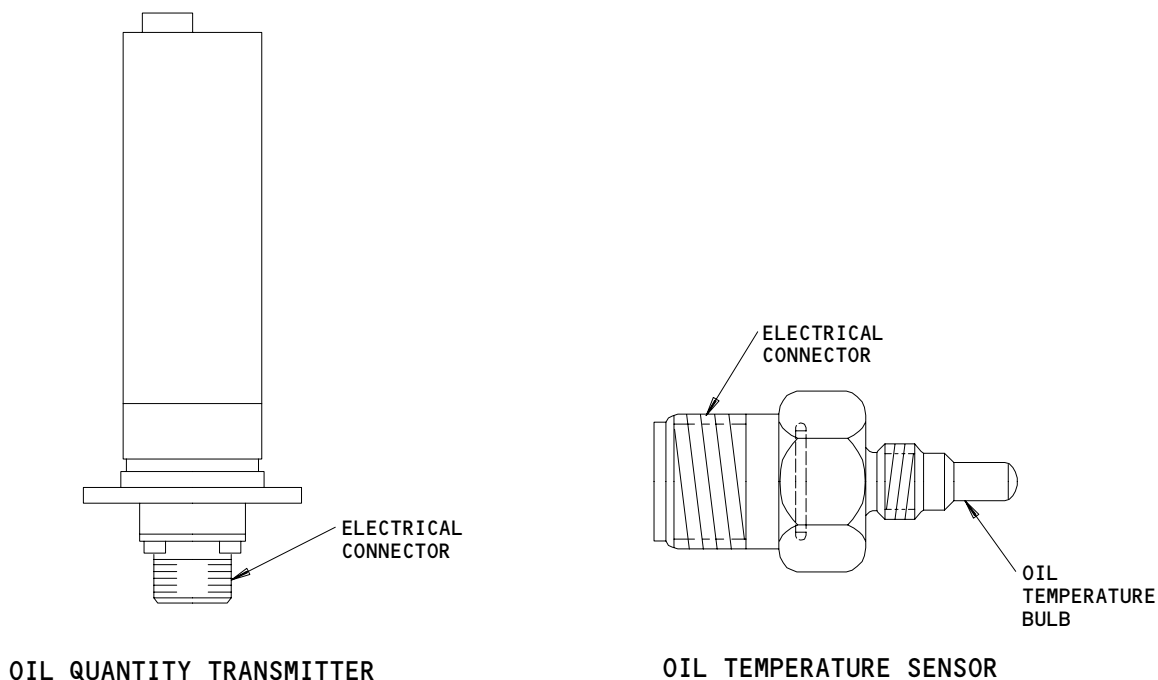
**49-94-00**

01

Page 3  
May 10/92

D. Oil Temperature Sensor (Fig. 3)

- (1) The sensor has a variable resistance bulb and an electrical connector. The switch is installed in a common housing with the switch for the low oil pressure on the load compressor casing. At speeds greater than 95 percent, an oil temperature signal to the APU control unit greater than 310° ( $\pm 10^\circ$ )F for more than 10 seconds causes a protective shutdown.
- (2) An automatic shutdown because of high oil temperature is written in BITE memory (AMM 49-61-00/001) and is shown as HIGH OIL TEMP on the REASON APU NOT OPERATING matrix. A failure of the sensor is shown as HOT SENSOR on the FAULTY LRU matrix.



APU Oil Indicators  
Figure 3

EFFECTIVITY	ALL
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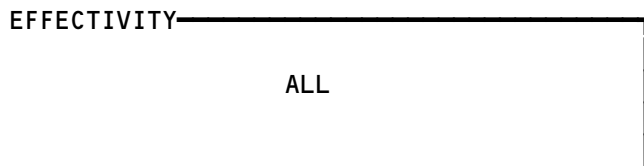
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**BOEING**  
 767  
 FAULT ISOLATION/MAINT MANUAL

APU OIL INDICATING SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
SENSOR - OIL TEMPERATURE, YBMS1	--	1	315AL, 316AR, APU COMPT, RIGHT SIDE LOAD COMPRESSOR	49-94-01
SWITCH - LOW OIL PRESSURE, YBMS2	--	1	315AL, 316AR, APU COMPT, RIGHT SIDE LOAD COMPRESSOR	49-94-02
TRANSMITTER - OIL QUANTITY, YBMS3	--	1	315AL, 316AR, APU COMPT, BOTTOM OF GEARBOX	49-94-04

APU Oil Indicating System - Component Index  
Figure 101

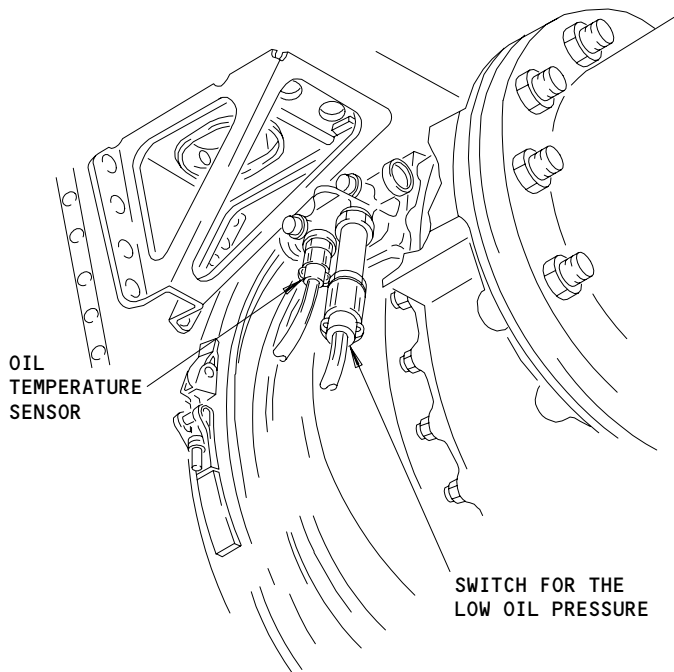
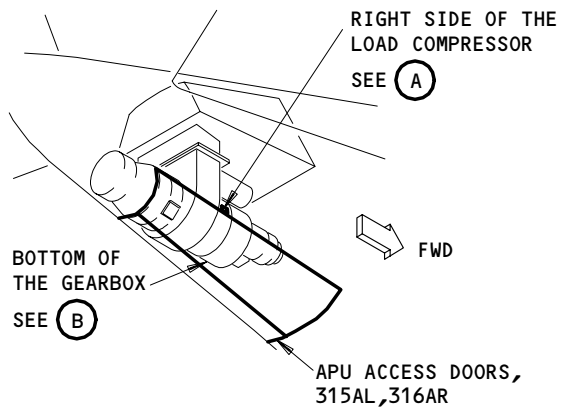


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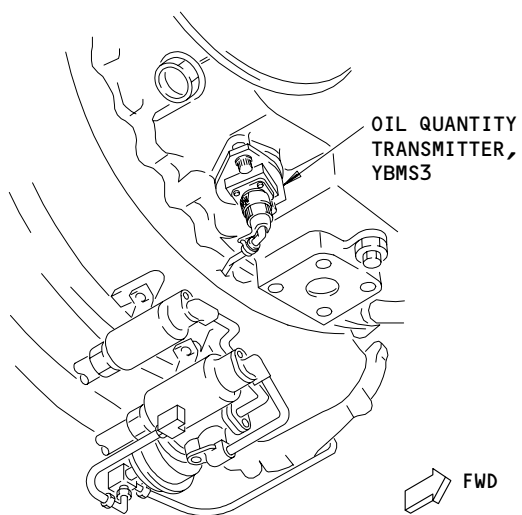
Page 101  
Aug 22/99

E17738



RIGHT SIDE OF THE LOAD COMPRESSOR

(A)



BOTTOM OF THE GEARBOX

(B)

APU Oil Indicating System - Component Location  
Figure 102

EFFECTIVITY	
	ALL

49-94-00

OIL TEMPERATURE SENSOR – REMOVAL/INSTALLATION

1. General

- A. This procedure contains the removal and the installation tasks for the oil temperature sensor on the APU.
- B. The oil temperature sensor is on the top right side of the APU, forward of the air inlet plenum. You can get access to the sensor through the APU access doors.

TASK 49-94-01-004-001

2. Oil Temperature Sensor Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment – Right
211	Flight Compartment – Left
212	Flight Compartment – Right
315	APU Compartment – Left
316	APU Compartment – Right

(2) Access Panels

315AL	APU Access Door – Left
316AR	APU Access Door – Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT
  - (b) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT

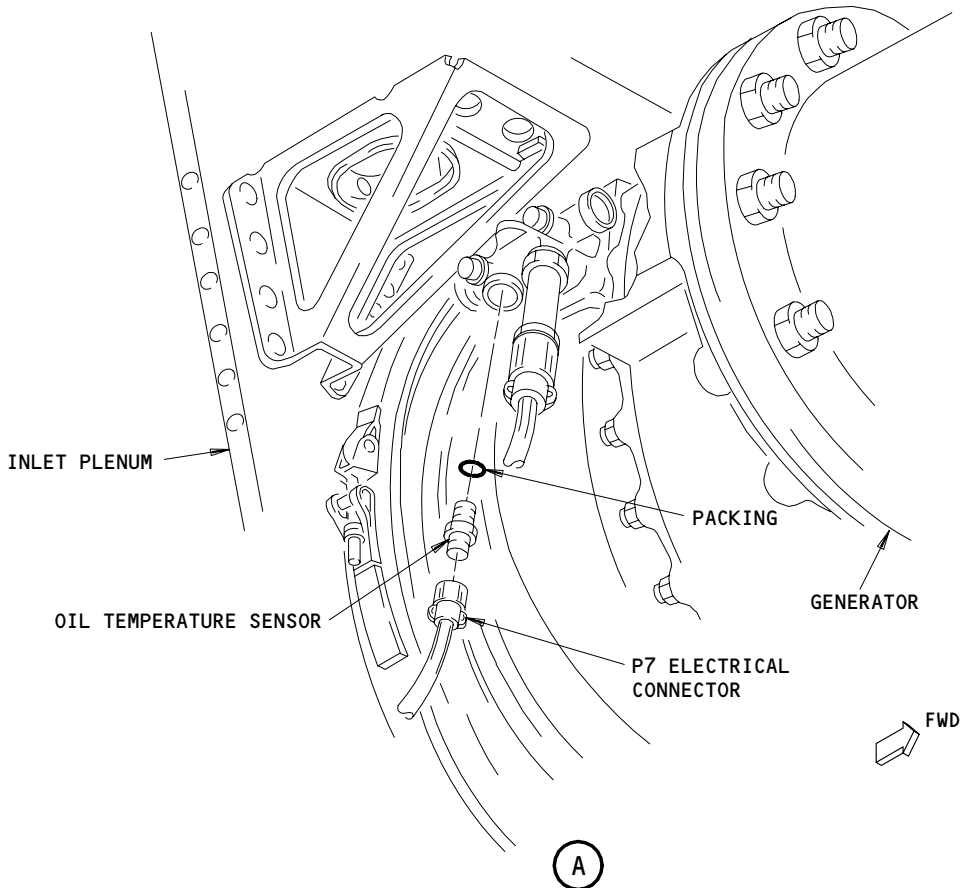
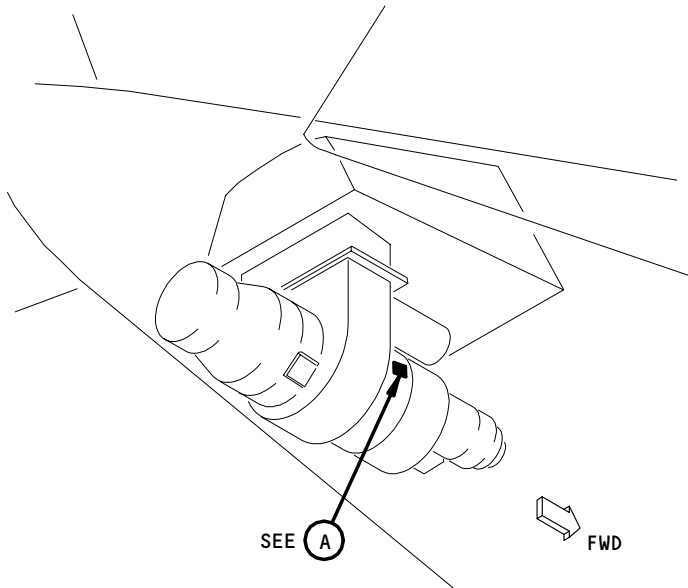
EFFECTIVITY

ALL

**49-94-01**

03

Page 401  
Aug 22/01



Oil Temperature Sensor Installation  
Figure 401

EFFECTIVITY	
	ALL

49-94-01

01

Page 402  
May 10/91



2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

(a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

(b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

(c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

(d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-006

WARNING: DO NOT TOUCH THE OIL SYSTEM PARTS IF THE APU IS HOT. THESE PARTS STAY HOTTER THAN THE OTHER ENGINE PARTS AFTER AN APU SHUTDOWN. IF YOU TOUCH AN OIL SYSTEM PART WHEN THE APU IS HOT, IT CAN BURN YOU.

- (4) Remove the oil temperature sensor:
- (a) Disconnect the P7 electrical connector from the oil temperature sensor.
- (b) Install caps on the P7 electrical connector and the oil temperature sensor for protection.

EFFECTIVITY

ALL

49-94-01

03

Page 403  
Aug 22/01

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (c) Remove the oil temperature sensor and the packing from the APU.
  - 1) Discard the packing.

TASK 49-94-01-404-007

3. Oil Temperature Sensor Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-61-05/201, APU Control Unit

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Oil Temperature Sensor Packing	49-94-01	01	50 55

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-008

- (1) Install the oil temperature sensor:
  - (a) Lubricate the new packing with a light coat of lubricant or oil.
  - (b) Install the packing on the oil temperature sensor.

EFFECTIVITY

ALL

**49-94-01**

01

Page 404  
Aug 22/05

- (c) Install the oil temperature sensor in the APU.
  - 1) Tighten the oil temperature sensor to 95–105 inch-pounds (10.7–11.9 newton-meters).
- (d) Install a lockwire on the oil temperature sensor.
- (e) Remove the caps from the P7 electrical connector and the oil temperature sensor.
- (f) Connect the P7 electrical connector to the oil temperature sensor.
- (g) Install a lockwire on the P7 electrical connector.

S 734-009

- (2) Do the self-test for the APU system (Ref 49-61-05/201).

S 864-010

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-011

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 panel.

S 794-012

- (5) Do a leakage test for the installation of the oil temperature sensor:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the oil temperature sensor for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-013

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-94-01

04

Page 405  
Aug 22/05

LOW OIL PRESSURE SWITCH - REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the Low Oil Pressure Switch
  - (2) An installation of the Low Oil Pressure Switch.
- B. The low oil pressure switch is on the top right side of the APU, forward of the air inlet plenum. You can get access to the switch through the APU access doors.

TASK 49-94-02-004-001

2. Low Oil Pressure Switch Removal (Fig. 401)

A. Access

(1) Location Zones

154	Aft Cargo Compartment - Right
211	Flight Compartment - Left
212	Flight Compartment - Right
315	APU Compartment - Left
316	APU Compartment - Right

(2) Access Panels

315AL	APU Access Door - Left
316AR	APU Access Door - Right
822	Aft Cargo Door

B. Procedure

S 864-002

- (1) Make sure the APU control switch on the P5 overhead panel is OFF and attach a DO-NOT-OPERATE tag.

S 864-003

- (2) Open these circuit breakers and attach DO-NOT-CLOSE tags:
  - (a) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

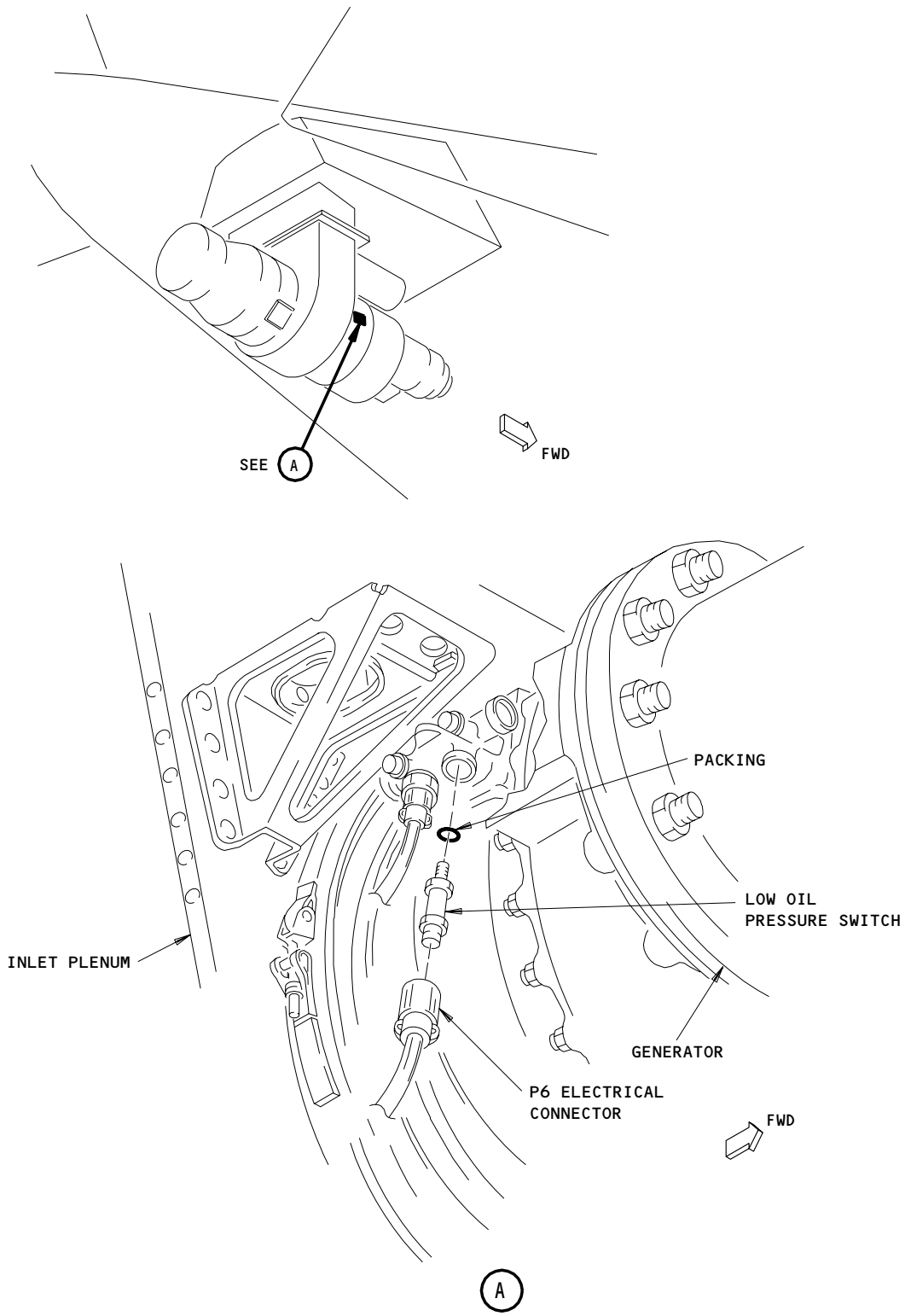
EFFECTIVITY

ALL

49-94-02

01

Page 401  
Aug 22/01



Low Oil Pressure Switch Installation  
Figure 401

EFFECTIVITY	
	ALL

49-94-02

01

Page 402  
Dec 10/98

- (b) P49 APU Auxiliary Panel
  - 1) 49C2, APU PRIME CONT
  - 2) 49C3, APU START

S 014-004

- (3) Open the left APU access door, 315AL, and right APU access door, 316AR:

- (a) While you hold the left access door in the closed position, open the four latches on the right access door.

NOTE: The left access door will open fully and the right access door will drop approximately one inch (2.5 cm) from the fuselage frame when the last latch is opened.

- (b) Open the left access door to the fully open position and manually lock the hold-open strut.

NOTE: You push the center knob down and turn the knob clockwise to manually lock the hold-open strut.

- (c) Push the right access door up and pull the detent latch aft until the latch disengages and releases the access door from the fuselage frame.

NOTE: The location of the detent latch is at the forward end of the right access door.

- (d) Open the right access door to the fully open position and manually lock the hold-open strut.

S 024-005

WARNING: DO NOT TOUCH THE OIL SYSTEM PARTS IF THE APU IS HOT. THESE PARTS STAY HOTTER THAN OTHER ENGINE PARTS AFTER AN APU SHUTDOWN. IF YOU TOUCH AN OIL SYSTEM PART WHEN THE ENGINE IS HOT, IT CAN BURN YOU.

- (4) Remove the low oil pressure (LOP) switch:
  - (a) Disconnect the P6 electrical connector from the LOP switch.
  - (b) Install caps on the P6 electrical connector and the LOP switch for protection.

EFFECTIVITY

ALL

49-94-02

03

Page 403  
Aug 22/01

**WARNING:** DO NOT LET THE OIL STAY ON YOUR SKIN. YOU CAN ABSORB POISONOUS MATERIALS FROM THE OIL THROUGH YOUR SKIN.

**CAUTION:** IMMEDIATELY CLEAN ALL THE OIL THAT FALLS ON THE ENGINE PARTS. THE OIL CAN CAUSE DAMAGE TO PAINT AND SOME RUBBER PARTS.

- (c) Remove the LOP switch and the packing from the APU.
  - 1) Discard the packing.

TASK 49-94-02-404-006

3. Low Oil Pressure Switch Installation (Fig. 401)

A. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-11-00/201, Auxiliary Power Unit
- (3) AMM 49-61-05/401, APU Control Unit

B. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Low Oil Pressure Switch Packing	49-94-02	01	50 55

D. Access

(1) Location Zones

- 154 Aft Cargo Compartment - Right
- 211 Flight Compartment - Left
- 212 Flight Compartment - Right
- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right
- 822 Aft Cargo Door

E. Procedure

S 424-007

- (1) Install the low oil pressure (LOP) switch:
  - (a) Lubricate the new packing with a light coat of lubricant or oil.
  - (b) Install the packing on the LOP switch.

EFFECTIVITY

ALL

**49-94-02**

01

Page 404  
Aug 22/05

- (c) Install the LOP switch in the APU.
  - 1) Tighten the LOP switch to 125-135 inch-pounds (14.1-15.3 newton-meters).
- (d) Install a lockwire on the LOP switch.
- (e) Remove the caps from the P6 electrical connector and the LOP switch.
- (f) Connect the P6 electrical connector to the LOP switch.
- (g) Install a lockwire on the P6 electrical connector.

S 734-008

- (2) Do the self-test for the APU system (AMM 49-61-05/401).

S 864-009

- (3) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
  - (a) P49 APU Auxiliary Panel
    - 1) 49C2, APU PRIME CONT
    - 2) 49C3, APU START
  - (b) P11 Overhead Panel
    - 1) 11B35, APU ALTN CONT

S 864-010

- (4) Remove the DO-NOT-OPERATE tag from the APU control switch on the P5 overhead panel.

S 794-011

- (5) Do a leakage test for the LOP switch installation:
  - (a) Do this task: APU Starting and Operation (AMM 49-11-00/201).
  - (b) During the APU operation, examine the LOP switch for leakage.
  - (c) Do this task: APU Shutdown Procedure (AMM 49-11-00/201).
  - (d) If you found leakage, repair the cause of it.

S 414-012

- (6) Close the left APU access door, 315AL, and right APU access door, 316AR:
  - (a) Manually unlock the two hold-open struts from the two APU access doors.

NOTE: You turn the center knob counterclockwise and pull the knob up to manually unlock the hold-open strut.

- (b) Lift the right access door until the detent latch engages and holds the access door on the fuselage frame.
- (c) Lift the left access door until the two APU access doors are approximately aligned.
- (d) Close the two APU access doors.
- (e) Close the four latches on the right access door.

EFFECTIVITY

ALL

49-94-02

04

Page 405  
Dec 22/07



LOW OIL PRESSURE SWITCH - INSPECTION/CHECK

1. General

- A. This procedure has the task to inspect the low oil pressure switch.
- B. The low oil pressure switch is on the top right side of the APU, forward of the air inlet plenum. You can get access to the switch through the APU access doors.

TASK 49-94-02-206-013

2. Low Oil Pressure Switch Inspection

A. References

- (1) AMM 49-94-02/401, Low Oil Pressure Switch

B. Equipment

- (1) Multimeter

C. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

D. Procedure

S 016-014

- (1) If it is installed, do this task: Low Oil Pressure (LOP) Switch Removal (AMM 49-94-02/401).

S 216-015

- (2) Visually examine the LOP switch:
  - (a) Examine the welds and the solder joints to make sure there are no cracks.
  - (b) Examine the LOP switch for other damage.

S 976-016

- (3) Use the multimeter to measure the resistance between pin 3 and the case of the LOP switch.
  - (a) The resistance must not be more than 0.025 ohms.

S 416-017

- (4) Do this task: LOP Switch Installation (AMM 49-94-02/401).

EFFECTIVITY

ALL

**49-94-02**

01

Page 601  
Apr 22/05

OIL QUANTITY TRANSMITTER – REMOVAL/INSTALLATION

1. General

- A. This procedure contains these tasks:
  - (1) A removal of the Oil Quantity Transmitter
  - (2) An installation of the Oil Quantity Transmitter.
- B. The oil quantity transmitter is on the bottom of the APU, forward of the air inlet plenum. You can get access to the transmitter through the APU access doors.

TASK 49-94-04-004-001

2. Oil Quantity Transmitter Removal (Fig. 401)

- A. References
  - (1) AMM 49-27-00/301, APU and Generator Lubrication System
- B. Access
  - (1) Location Zones
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right

C. Procedure

S 684-002

- (1) Drain the APU oil reservoir (AMM 49-27-00/301).

S 024-003

**WARNING:** DO NOT TOUCH THE OIL SYSTEM PARTS IF THE APU IS HOT. THESE PARTS STAY HOTTER THAN OTHER ENGINE PARTS AFTER AN APU SHUTDOWN. IF YOU TOUCH AN OIL SYSTEM PART WHEN THE ENGINE IS HOT, IT CAN BURN YOU.

- (2) Remove the oil quantity transmitter:
  - (a) Disconnect the P8 electrical connector from the oil quantity transmitter.
  - (b) Install caps on the P8 electrical connector and the mating receptacle.
  - (c) Remove the two bolts and the washers that attach the oil quantity transmitter to the APU gearbox.
  - (d) Remove the oil quantity transmitter and the packing from the APU gearbox.
    - 1) Discard the packing.

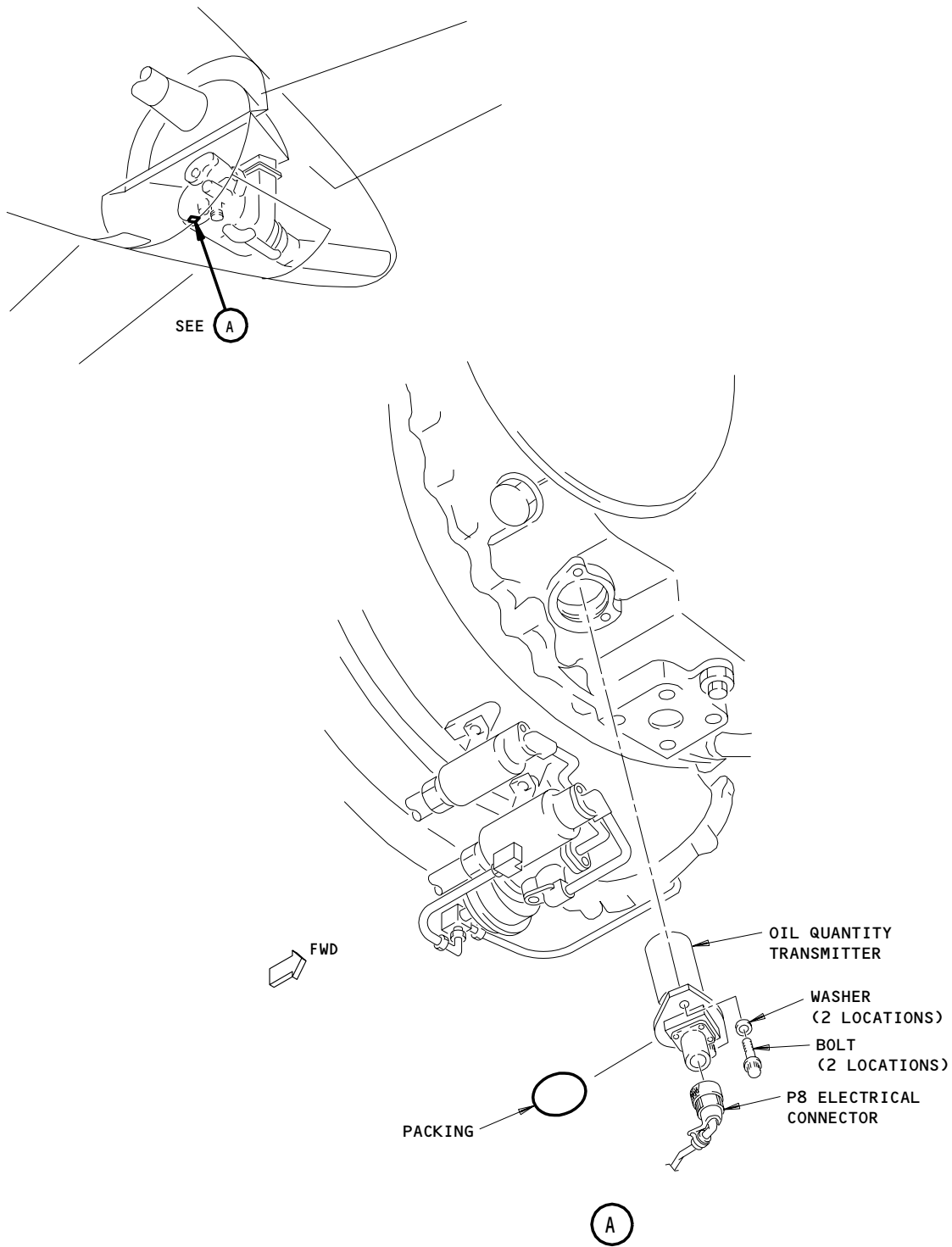
EFFECTIVITY

ALL

**49-94-04**

02

Page 401  
Aug 22/01



Oil Quantity Transmitter Installation  
Figure 401

EFFECTIVITY

ALL

**49-94-04**

02

Page 402  
Dec 10/98

TASK 49-94-04-404-004

3. Oil Quantity Transmitter Installation (Fig. 401)

A. Consumable Materials

- (1) D50056 Oil, Aircraft Turbine Engine (AMM 12-13-04/301) or
- (2) D00341 Lubricant - Santovac 5

B. References

- (1) AMM 12-13-04/301, APU Servicing
- (2) AMM 49-27-00/301, APU and Generator Lubrication System

C. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401		Oil Quantity Transmitter  Packing	49-94-00	01	5, 72 or 405 6, 75 or 410

D. Access

(1) Location Zones

- 315 APU Compartment - Left
- 316 APU Compartment - Right

(2) Access Panels

- 315AL APU Access Door - Left
- 316AR APU Access Door - Right

E. Procedure

S 424-012

(1) Install the oil quantity transmitter:

- (a) Lubricate the new packing with a light coat of lubricant or oil.
- (b) Install the packing on the oil quantity transmitter.
- (c) Install the oil quantity transmitter in the APU gearbox with the two bolts and the washers.
  - 1) Tighten the bolts to 50-55 inch-pounds (5.7-6.2 newton-meters).
- (d) Install a lockwire between the two bolts.
- (e) Connect the P8 electrical connector to the oil quantity transmitter.
- (f) Install a lockwire on the P8 electrical connector.

S 614-013

(2) Do the servicing for the APU oil reservoir (AMM 49-27-00/301).

EFFECTIVITY

ALL

**49-94-04**

02

Page 403  
Aug 22/05

OIL QUANTITY TRANSMITTER – INSPECTION/CHECK

1. General

- A. This procedure contains this task:
  - (1) A inspection of the Oil Quantity Transmitter.
- B. The oil quantity transmitter is on the bottom of the APU, forward of the air inlet plenum. You can get access to the transmitter through the APU access doors.

TASK 49-94-04-206-007

2. Oil Quantity Transmitter Inspection

- A. Standard Tools and Equipment
  - (1) Multimeter
- B. Access
  - (1) Location Zones
    - 315 APU Compartment – Left
    - 316 APU Compartment – Right
  - (2) Access Panels
    - 315AL APU Access Door – Left
    - 316AR APU Access Door – Right

C. Procedure

- S 016-008
  - (1) If it is installed, do this task: Oil Quantity Transmitter Removal (AMM 49-94-04/401).
- S 216-009
  - (2) Visually examine the oil quantity transmitter:
    - (a) Examine the oil quantity transmitter to make sure the welds and the solder joints do not have cracks.
    - (b) Examine the oil quantity transmitter for other damage.
- S 976-010
  - (3) Use the multimeter to measure the resistance between the transmitter case (receptacle flange) and pin 7.
    - (a) The resistance must be 1 ohm (maximum).
- S 416-011
  - (4) Do this task: Oil Quantity Transmitter Installation (AMM 49-94-04/401).

EFFECTIVITY

ALL

**49-94-04**

02

Page 601  
Aug 22/05