GPA Group plc

PAGE	DATE	CODE
CHAPTER 75 TAB		
AIR		
EFFECTIVE PAGES		
SEE LAST PAGE OF LIST FOR		
NUMBER OF PAGES		
75-CONTENTS		
1	MAR 20/97	RGUI
R 2	JAN 20/09	RGUI.1
R 3	JAN 20/09	RGUI.1
R 4	JAN 20/09	RGUI.1
75-00-00		
1	JUN 15/84	R01
2	BLANK	
75-00-00		
601	SEP 20/93	R01
602	DEC 20/90	R01
603	DEC 20/90	R01
604	BLANK	
75-21-00		
1	DEC 20/92	R01
2	SEP 20/93	R01
3	DEC 20/92	R02
4	BLANK	
75-32-00 CONFIG 2		
1	MAR 20/96	R02
2	JAN 28/02	R03
3	MAR 20/96	R01
4	MAR 20/96	R01
5	MAR 20/96	R01
6	MAR 20/96	R01
7	MAR 20/96	R01
8	MAR 20/96	R01
9	JAN 28/02	R03
10	MAR 20/96	R01
11	MAR 20/96	R01
12	JAN 28/02	R03
13	MAR 20/96	R01
14	MAR 20/96	R01
15	JAN 28/02	R03
16	JAN 28/02	R03
17	JAN 28/02	R01
18	MAR 20/96	R02
19	JAN 28/02	R01
20	BLANK	
75-32-00 CONFIG 4		
1	SEP 28/01	R01
2	SEP 28/01	R01
3	SEP 28/01	R01
4	SEP 28/01	R01
75-32-00 CONFIG 4		CONT.
5	SEP 28/01	R01
6	SEP 28/01	R01
7	SEP 28/01	R01
8	SEP 28/01	R01
9	SEP 28/01	R01
10	SEP 28/01	R01
11	SEP 28/01	R01
12	SEP 28/01	R01
13	SEP 28/01	R01
14	SEP 28/01	R01
15	SEP 28/01	R01
16	SEP 28/01	R01
17	SEP 28/01	R01
18	SEP 28/01	R01
19	SEP 28/01	R01
20	SEP 28/03	R01
21	SEP 28/01	R01
22	SEP 28/01	R01
75-32-00 CONFIG 3		
101	JAN 28/02	R03B
102	JAN 28/02	R03B
103	JAN 28/02	R03B
104	JAN 28/02	R03B
105	JAN 28/02	R03B
106	JAN 28/02	R03B
75-32-00 CONFIG 4		
101	MAY 28/03	R01
102	MAY 28/03	R01
103	MAY 28/03	R01
104	MAY 28/03	R01
105	MAY 28/03	R01
106	MAY 28/03	R01
75-32-00 CONFIG 3		
201	DEC 20/95	R02
202	DEC 20/95	R02
203	SEP 20/94	R01
204	SEP 20/94	R01
205	SEP 20/94	R01
206	JAN 20/98	R01
207	SEP 20/94	R01
208	SEP 20/94	R01
209	MAY 28/00	R03
210	MAY 28/00	R01
211	MAY 28/00	R01
212	MAY 28/00	R02
213	DEC 20/95	R01
214	DEC 20/95	R01
215	DEC 20/95	R01
216	BLANK	
75-32-00 CONFIG 4		
201	JAN 28/00	R02
202	JAN 28/00	R02
203	JAN 28/00	R02
204	JAN 28/00	R02
75-32-00 CONFIG 4		CONT.
205	MAY 28/00	R02
206	MAY 28/00	R02
207	MAY 28/00	R02
208	MAY 28/00	R02
209	JAN 28/00	R02
210	JAN 28/00	R02
211	JAN 28/00	R02
212	JAN 28/00	R02
213	MAY 28/00	R02
214	JAN 28/00	R02
215	JAN 28/00	R02
216	JAN 28/00	R02
217	MAY 28/00	R04
218	MAY 28/00	R03
219	JAN 28/00	R03
220	JAN 28/00	R03
75-32-01		
201	MAY 28/01	R01
202	MAY 28/01	R01
75-32-01		
401	DEC 20/93	R03
402	JAN 28/02	R03
403	JUN 20/94	R01
404	JAN 28/07	R05
405	JAN 28/02	R04
406	JAN 28/02	R03
75-32-02		
401	SEP 28/01	R01
402	MAR 20/94	R01
403	JAN 20/98	R01
404	SEP 28/01	R01
75-32-03		
401	MAY 28/01	R01B
402	MAY 28/01	R01B
403	MAY 28/01	R01B
404	MAY 28/01	R01B
405	MAY 28/01	R01B
406	MAY 28/01	R01B
407	MAY 28/01	R01B
408	MAY 28/01	R01B
409	MAY 28/01	R01B
410	MAY 28/01	R01B
411	MAY 28/01	R01B
412	MAY 28/01	R01B
413	MAY 28/01	R01B
414	MAY 28/01	R01B
415	MAY 28/01	R01B
416	BLANK	
75-32-04		
401	SEP 28/07	R01B
402	MAY 28/01	R01B
403	MAY 28/01	R01B
404	MAY 28/01	R01B

GPA Group plc

PAGE	DATE	CODE
75-32-04		CONT.
405	SEP 28/05	R01B
406	SEP 28/05	R01B
407	SEP 28/05	R01B
408	SEP 28/07	R01B
75-32-04		
601	DEC 20/93	R01
602	SEP 20/93	R01
603	DEC 20/93	R01
604	BLANK	
75-32-04		
801	JAN 28/05	R01
802	JAN 28/05	R01
803	JAN 28/05	R01
804	JAN 28/05	R01
805	JAN 28/05	R01
806	SEP 28/99	R01
807	JAN 28/05	R01
808	JAN 28/05	R01
75-32-05		
401	MAY 28/01	R01B
402	MAY 28/01	R01B
403	MAY 28/01	R01B
404	MAY 28/01	R01B
405	MAY 28/01	R01B
406	MAY 28/01	R01B
75-32-07		
401	MAY 28/99	R02
402	JAN 20/98	R02
403	MAR 20/94	R01
404	MAY 28/99	R03
75-32-07		
501	MAY 28/99	R01
502	MAY 28/99	R01
503	JUN 20/94	R01
504	JUN 20/94	R01
75-32-09		
601	DEC 20/90	R01
602	SEP 20/93	R01
603	DEC 20/90	R01
604	BLANK	
75-32-10		
401	DEC 20/90	R01
402	SEP 20/93	R01
403	SEP 20/93	R01
404	DEC 20/90	R01
75-32-10		
601	JAN 28/00	R01
602	JAN 28/00	R01

PAGE	DATE	CODE
75-32-12		
401	JAN 28/05	R01
402	JAN 28/00	R01
403	MAY 28/07	R01
404	JAN 28/05	R01
405	MAY 28/05	R01
406	BLANK	
75-32-14		
401	DEC 20/93	R01
402	MAY 28/99	R01
403	MAR 20/94	R01
404	MAY 28/99	R01
405	SEP 20/93	R01
406	SEP 20/93	R01
407	MAY 28/99	R02
408	SEP 28/99	R02
75-32-15		
201	SEP 20/94	R01
202	JAN 28/05	R01
75-32-15		
401	JUN 20/93	R01
402	SEP 20/94	R01
403	SEP 20/93	R01
404	JUN 20/93	R01
405	JUN 20/93	R01
406	BLANK	
75-32-15		
501	MAY 20/98	R01
502	SEP 28/00	R01
503	SEP 28/00	R01
504	SEP 28/00	R01
505	SEP 28/00	R01
506	BLANK	
75-32-19		
401	JAN 28/01	R01
402	SEP 28/00	R01
403	SEP 28/00	R01
404	SEP 28/00	R01
405	SEP 28/00	R01
406	SEP 28/00	R01

PAGE	DATE	CODE

CHAPTER 75 - AIR

TABLE OF CONTENTS

[*] RB211-535E4 ENGINES WITH BVCU C8E38-9

CHAPTER 75 - AIR

TABLE OF CONTENTS

CHAPTER 75 - AIR

TABLE OF CONTENTS

CHAPTER 75 - AIR

TABLE OF CONTENTS

AIR - DESCRIPTION AND OPERATION

1. General
   A. The engine air system is comprised of the Internal Cooling and Sealing Air System (AMM 72-02-00), Accessory Cooling System (AMM 75-21-00) and the Compressor Bleed Control System (AMM 75-32-00).
   B. The Internal Cooling and Sealing Air System uses compressor air to cool the internals of the engine. It also uses this air to seal oil areas to prevent leakage.
   C. The Accessory Cooling System uses outside ram air and vented fan air to cool and ventilate the engine components and compartments.
   D. The Compressor Bleed Control System vents air from the intermediate pressure (IP) and high pressure (HP) compressor sections to maintain a stable airflow through the compressor sections.
   E. Air required for airplane bleed air and environmental control systems is supplied by two large offtakes that connect with the HP compressor, stages 2 and 6.
   F. Air for engine inlet cowl thermal anti-icing (AMM 30-21-00) is supplied from a tapping in the HP compressor stage 2 offtake.
   G. Additional tappings in the engine provide HP compressor stage 6 air to the engine fuel system (AMM 73-21-00) and the aircraft environmental control system.

AIR - INSPECTION/CHECK

1. General
   A. This procedure contains the data to visually examine the engine air system. In this procedure the Power Lever Angle (PLA) Bleed Valve Control Unit (BVCU) Transducer is referred to as the transducer.
   B. In this procedure the T2 Sonic Thermocouple is referred to as the thermocouple.
   C. In this procedure the HP Compressor Bleed Valve is referred to as the HP bleed valve.
   D. In this procedure the IP Compressor Bleed Valve is referred to as the IP bleed valve.

TASK 75-00-00-216-001-R00

2. Examine the Air System
   A. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
      (2) AMM 72-03-01/401, Compressor Fairings
      (3) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          413AL Fan Cowl Panel, Left Engine
          414AR Fan Cowl Panel, Left Engine
          415AL Thrust Reverser, Left Engine
          416AR Thrust Reverser, Left Engine
          423AL Fan Cowl Panel, Right Engine
          424AR Fan Cowl Panel, Right Engine
          425AL Thrust Reverser, Right Side
          426AR Thrust Reverser, Right Engine

   C. Prepare to Examine the Air System

      S 016-002-R00

      CAUTION: OBEY THE PRECAUTIONS FOR KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

      (1) Open the fan cowl panels (AMM 71-11-04/201).

      S 016-007-R00

      WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

      (2) Open the thrust reversers (AMM 78-31-00/201).

S 016-008-R00
(3) Remove the applicable compressor fairings (AMM 72-03-01/401).

D. Procedure

S 216-025-R00
(1) Examine the zone seals on the front and rear firewalls of the fan case for the condition and the correct installation.

S 216-026-R00
(2) Examine the zone seals on the thrust reverser for the condition and the correct installation.

S 216-027-R00
(3) Make sure the air inlet for zone 1 is not blocked.

S 216-028-R00
(4) Make sure the exhaust for zone 1 is not blocked.

S 216-029-R00
(5) Examine the air inlets on the cooling manifold of the turbine case for the condition and the correct installation.

S 216-030-R00
(6) Examine the face seals on the cooling manifold for the condition and the correct installation.

S 216-031-R00
(7) Examine the BVCU and the wire bundles for the condition and the correct installation.

S 216-032-R00
(8) Examine the transducer and the wire bundles to the BVCU for the condition and the correct installation.

S 216-033-R00
(9) Examine the wire bundle from the N2 pulse probe to the BVCU for the condition and the correct installation.

S 216-034-R00
(10) Examine the wire bundle from the thermocouple to the BVCU for the condition and the correct installation.

S 216-035-R00
(11) Examine the HP bleed valves and the exhaust ducts for the condition and the correct installation.

S 216-036-R00
(12) Examine the IP bleed valves for the condition and the correct installation.

S 216-037-R00

(13) Examine the solenoids on the HP bleed valves and the wire bundles for the condition and the correct installation.

S 216-038-R00

(14) Examine the solenoids on the IP bleed valves and the wire bundles for the condition and the correct installation.

S 216-039-R00

(15) Examine the altitude switch and the wire bundles for the condition and the correct installation.

E. Put the Airplane Back to Its Usual Condition

S 416-004-R00

(1) Install the applicable compressor fairings (AMM 72-03-01/401).

S 416-005-R00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Close the thrust reversers (AMM 78-31-00/201).

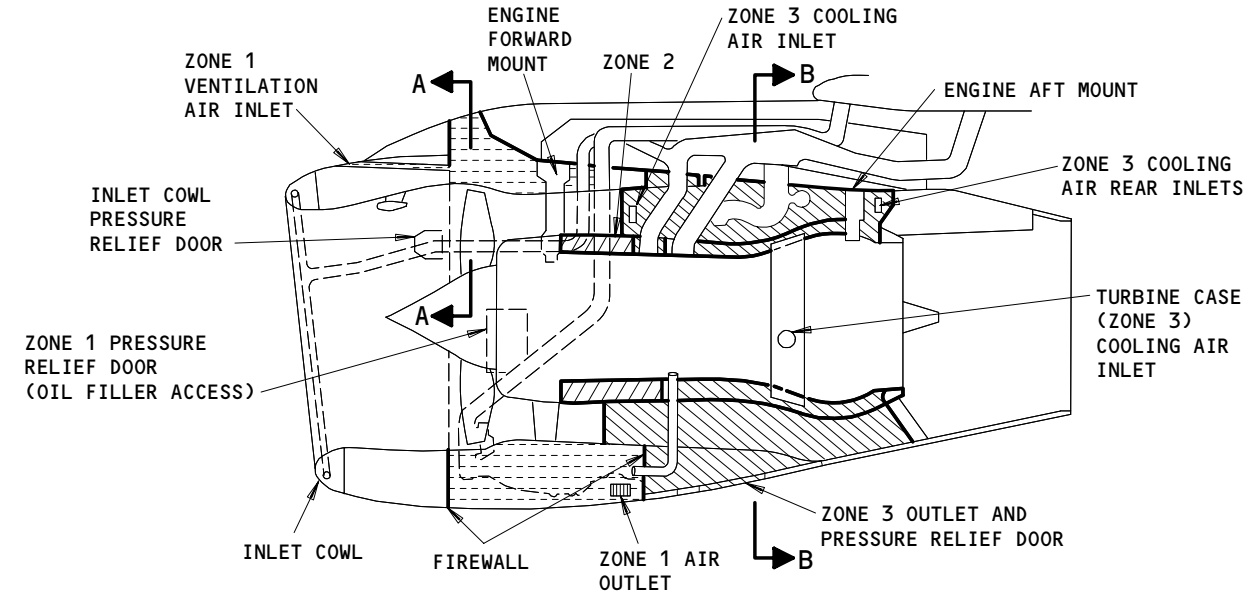
S 416-021-R00

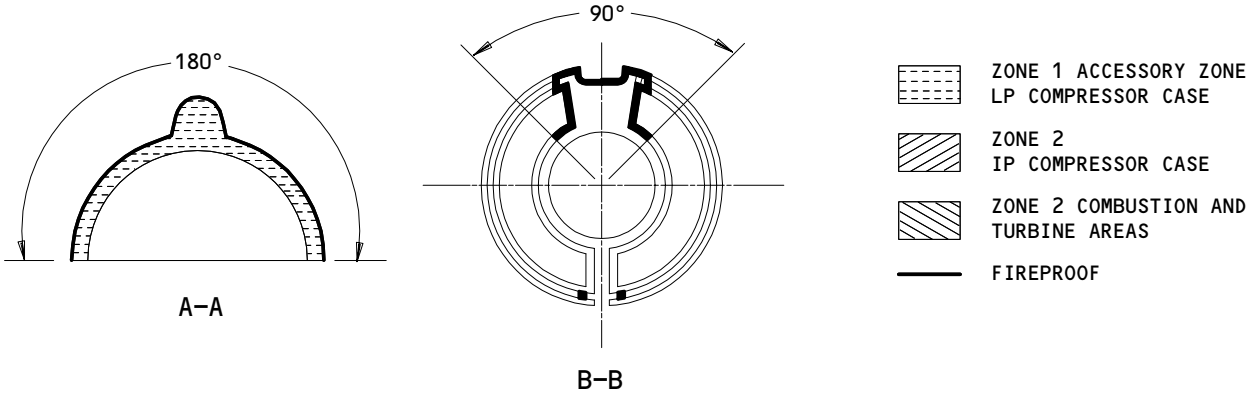
CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

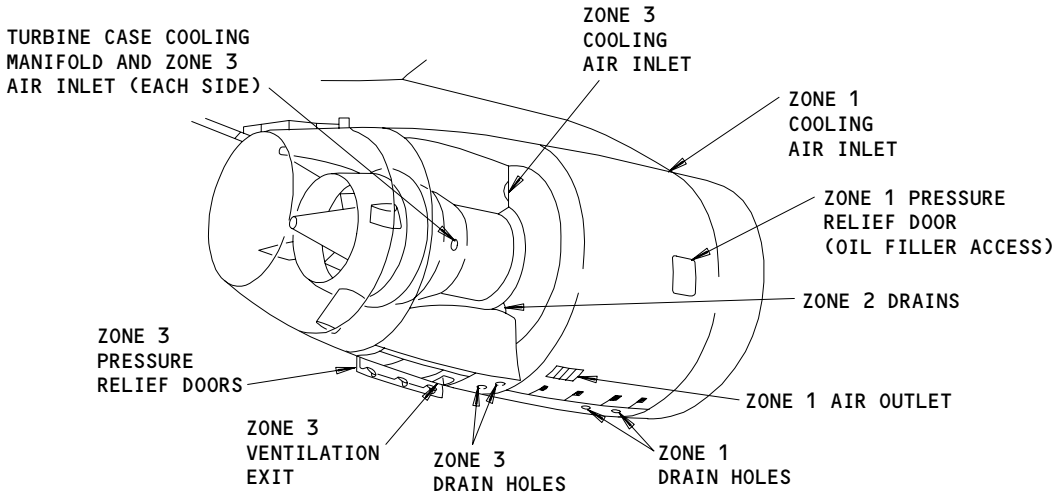
(3) Close the fan cowl panels (AMM 71-11-04/201).

ACCESSORY COOLING SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. To cool the engine mounted accessory units and maintain under-cowl temperatures at an acceptable level, calibrated airflows are provided around the propulsion unit. These airflows also perform a ventilation function to prevent the accumulation of hazardous vapors.
   B. The propulsion unit is divided into zones separated from each other and from the airplane strut by fireproof diaphragms and seals.
   C. Zone 1 is cooled and ventilated by the flow of ambient air caused by airplane forward speed. The remaining zones are cooled and ventilated by LP compressor (fan) delivery air.
2. Components Details (Fig. 1)
   A. Zone 1
      (1) Zone 1 is a cool zone and comprises the annular space between the LP compressor case and the cowling doors, bounded by the front, rear and strut firewalls. The zone houses the bulk of the flammable fluid system accessories.
      (2) Cooling and ventilation is by ram air ducted through the inlet cowl into zone 1 and exhausted through a louvered outlet integral with the right cowling door.
      (3) In the event of over-pressurization, the oil tank filler access panel is designed as a pressure relief door which will open under a pre-determined outward pressure differential.
   B. Zone 2
      (1) Zone 2 is the annular space between the IP compressor/intermediate cases and the compressor fairings. The only flammable fluid system features in this zone are the engine oil tubes to and from the front bearing housing.
      (2) There are no designed air inlets into zone 2. Cooling and ventilation is restricted to air leakage through the unsealed compressor fairings. Air movement is encouraged by two aft facing zone 2 drain spouts which project into the fan delivery air stream.
   C. Zone 3
      (1) Zone 3 is the annular space between the combustion/turbine cases and the thrust reverser inner barrel, extending into the upper and lower bifurcations bounded by the strut firewall and the thrust reverser latch access doors. This is a hot zone and contains flammable fluid system tubes.
      (2) Cooling and ventilation is by fan delivery air ducted through two inlets in the thrust reverser inner barrel, and into the turbine case cooling manifold. After cooling the turbine case the air passes into zone 3 via outlets in the manifold. An additional small cooling flow, through the top splitter fairing, is provided to cool the thrust reverser hydraulic tubes.







Engine External Cooling and Ventilation
Figure 1

(3) The thrust reverser latch access panels are designed as pressure relief doors which will open under a pre-determined pressure differential.
(4) Pressure relief doors in the lower surface of the afterbody fairing will open under a pre-determined differential pressure.

COMPRESSOR BLEED CONTROL SYSTEM - DESCRIPTION AND OPERATION

1. General
   A. To maintain a stable airflow through the compressor section during certain transient and steady running conditions, a percentage of air is vented from the intermediate pressure (IP) and high pressure (HP) compressors. This is achieved through six bleed valves: three venting IP compressor stage 6 (IP6) air, two venting HP compressor stage 3 (HP3) air and one venting HP stage 2 (HP2) air. All bleed valves discharge to LP compressor (fan) outlet pressure.
   B. The bleed valves are controlled through five solenoids. Two IP solenoids control two bleed valves and one bleed valve respectively, while the one HP2 and two HP3 bleed valves are controlled through individual solenoids.
   C. IP and HP solenoids are operated in sequence by an electronic compressor bleed valve control unit (BVCU), that senses IP compressor speed (N2), IP compressor inlet temperature (T2) and thrust lever position, and controls the bleed valves as a function of N2/√T2. The schedule is affected by rate of change of thrust lever position, measured by a thrust lever angle transducer, and N2/√T2. An altitude switch senses ambient pressure (P0) to provide inputs to the BVCU to control the value of N2/√T2 at which the bleed valves close above a predetermined altitude.
   D. To ensure positive and stable operation, the bleed valves are scheduled so that valve closure during acceleration is effected at a higher N2/√T2 value than that at which they open during deceleration.
   E. In the event of failure of either N2 or T2 signal to the BVCU, when the ratio of N2/√T2 would be affected to higher or lower limits, depending upon which signal failed; scheduling of IP and HP bleed valves is provided through a back-up system, whereby bleed valves are controlled as a function of throttle angle. The back-up schedule represents an approximation of N2/√T2 schedule.
   F. In the failure made at low power, no electrical power to solenoids, the IP bleed valves and the HP3.1 bleed valve will open and stay open. The remaining HP bleed valves will close and stay closed. At power adjustments above the HP 3.1 relief valve blow-off point, the HP valves will close and stay closed to prevent too much loss of take-off power.
   G. A deceleration detector unit (DDU), integral with the BVCU, has the capability of signalling both HP3 bleed valves to open should N2 exceed a rate of deceleration at high power settings recognized as a surge. The HP3 bleed valves will remain open for a predetermined period, sufficient to allow the engine to recover from the surge condition.
   H. The transient pressure sensor unit (TPU) is designed to detect the onset of compressor surge at low power settings, particularly in the event of compressor damage by bird ingestion, and take corrective control action to allow the engine to recover. The engine parameter used to detect compressor surge is HP compressor delivery pressure P4.

I. Fig. 1 and Fig. 2 show the location of the system units and Fig. 3 illustrates the system schematically.

2. Component Details

A. IP Compressor Bleed Valve System

(1) The IP bleed valve system (Fig. 4) includes three bleed valves and two solenoids. The bleed valves are mounted around the IP compressor: two on the right-hand side, identified as No. 1 (first stage), and one on the left-hand side, identified as No. 2 (second stage). The IP solenoids are mounted on the front face of the gas generator panel support, each side of the splitter nose fairing. The right-hand solenoid operates the No. 1 bleed valves and the left-hand solenoid operates the No. 2 bleed valve.

(2) The IP solenoids are sequenced, through the BVCU, to close all IP bleed valves simultaneously during steady state acceleration conditions, except at altitudes above 18,000 feet when first stage bleed valve closure is switched to a higher N2/√T2 value through the action of the altitude switch.

(3) IP Compressor Bleed Valves

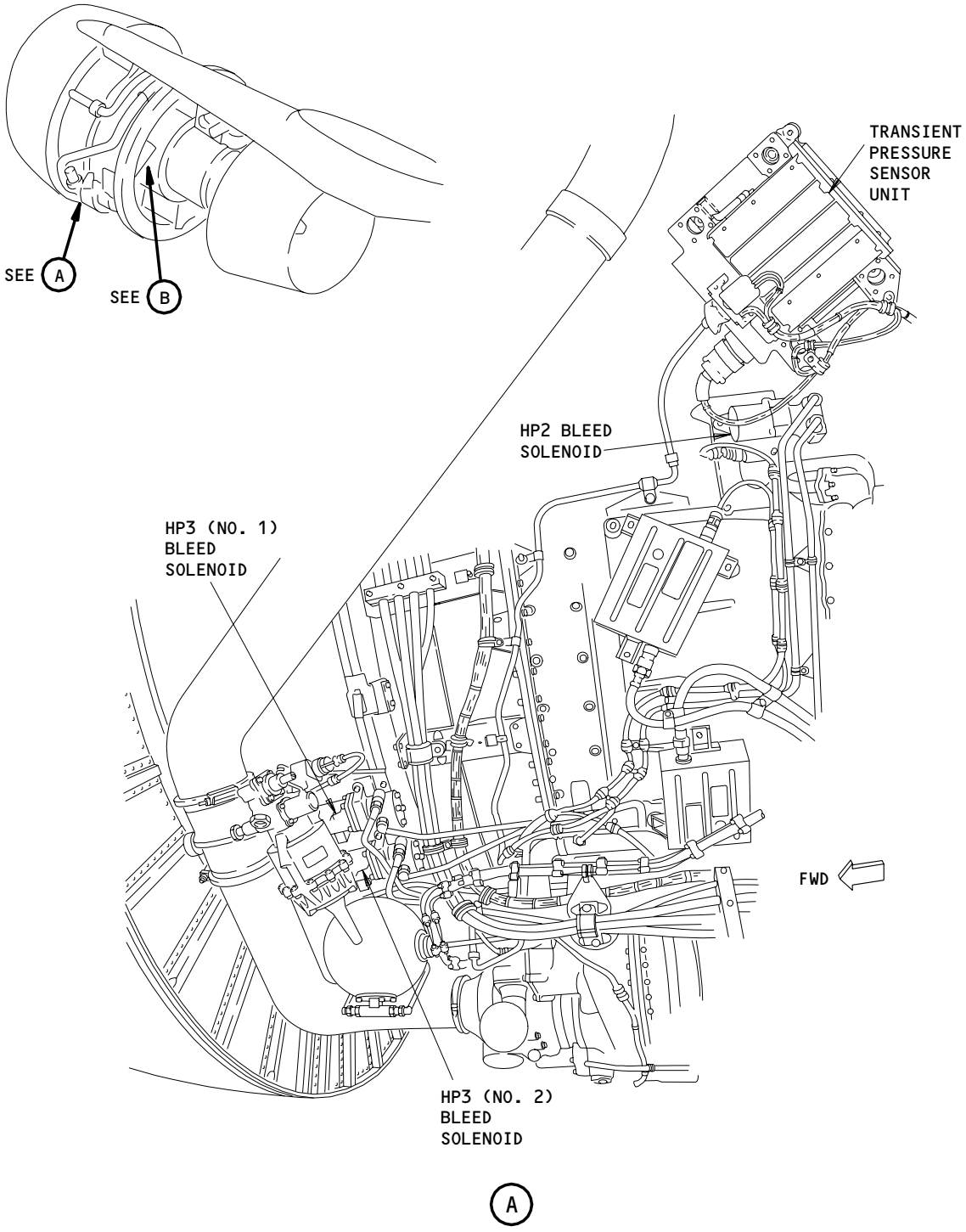
(a) Each bleed valve consists of a spring loaded cylindrical valve and piston assembly, which operates within a valve body, to open or close ports in the compressor case. Seals on the piston and body form two chambers; the upper chamber is open to IP6 air through holes in the piston; the lower chamber is open to HP servo air supplied through the applicable IP solenoid.

(b) The position for the valve and piston assembly is controlled by either venting or pressurizing the lower chamber, as determined by the schedule of the applicable solenoid.

(4) IP Bleed Valve Solenoids

(a) Each solenoid consists of two separate coils (A and B), and a spring loaded valve assembly operating within a body incorporating two tube connections and a vent port. The tube connections are linked, by external tube, one to the HP3 air manifold and the other to the bleed valve lower chamber.

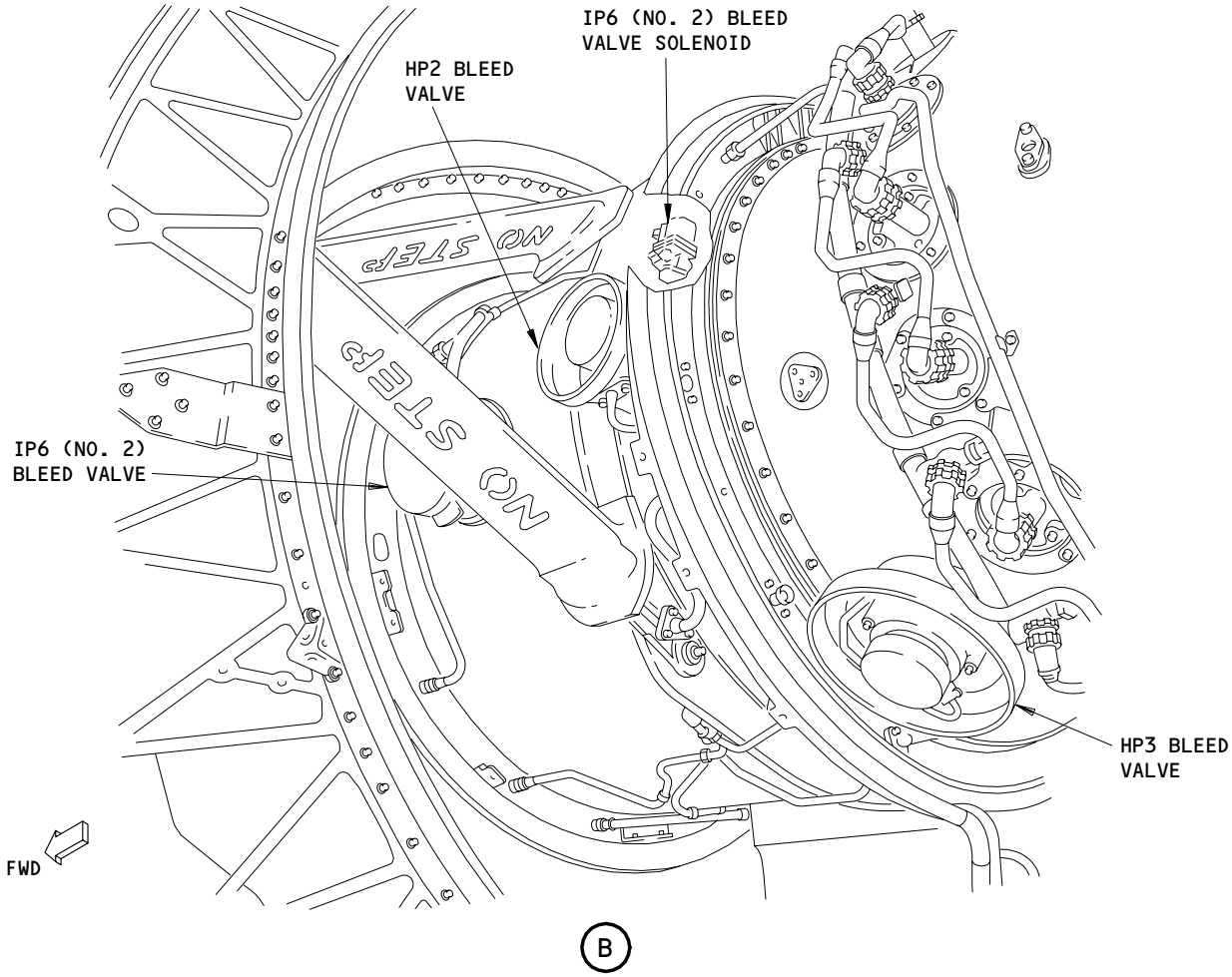
(b) Each unit operates such that with the solenoid not energized, (as shown in Fig. 4), and the engine in operation, the servo vent is closed. HP3 air is felt at the air inlet, and pressure builds up behind the spring loaded piston which holds the inlet valve in the open position. This permits air to go through the air inlet and be felt at the service port, and the bleed valve lower chamber. In this condition the bleed valve is open.



Location of Bleed System Units (Left Side View)
Figure 1 (Sheet 1)

EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-9

961692



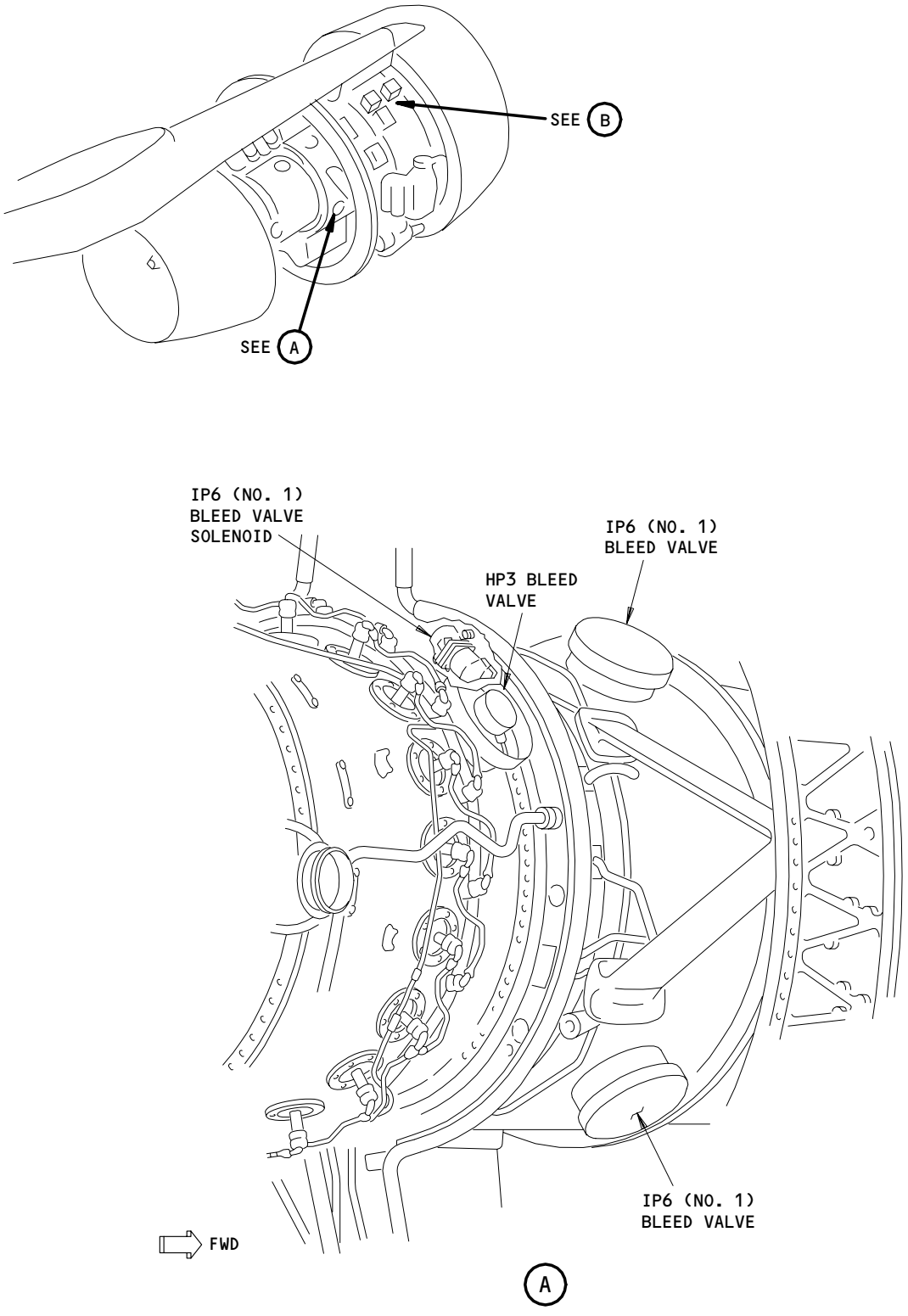
VIEW IN THE FORWARD DIRECTION
SHOWING ANGULAR POSITION OF BLEEDS

65295

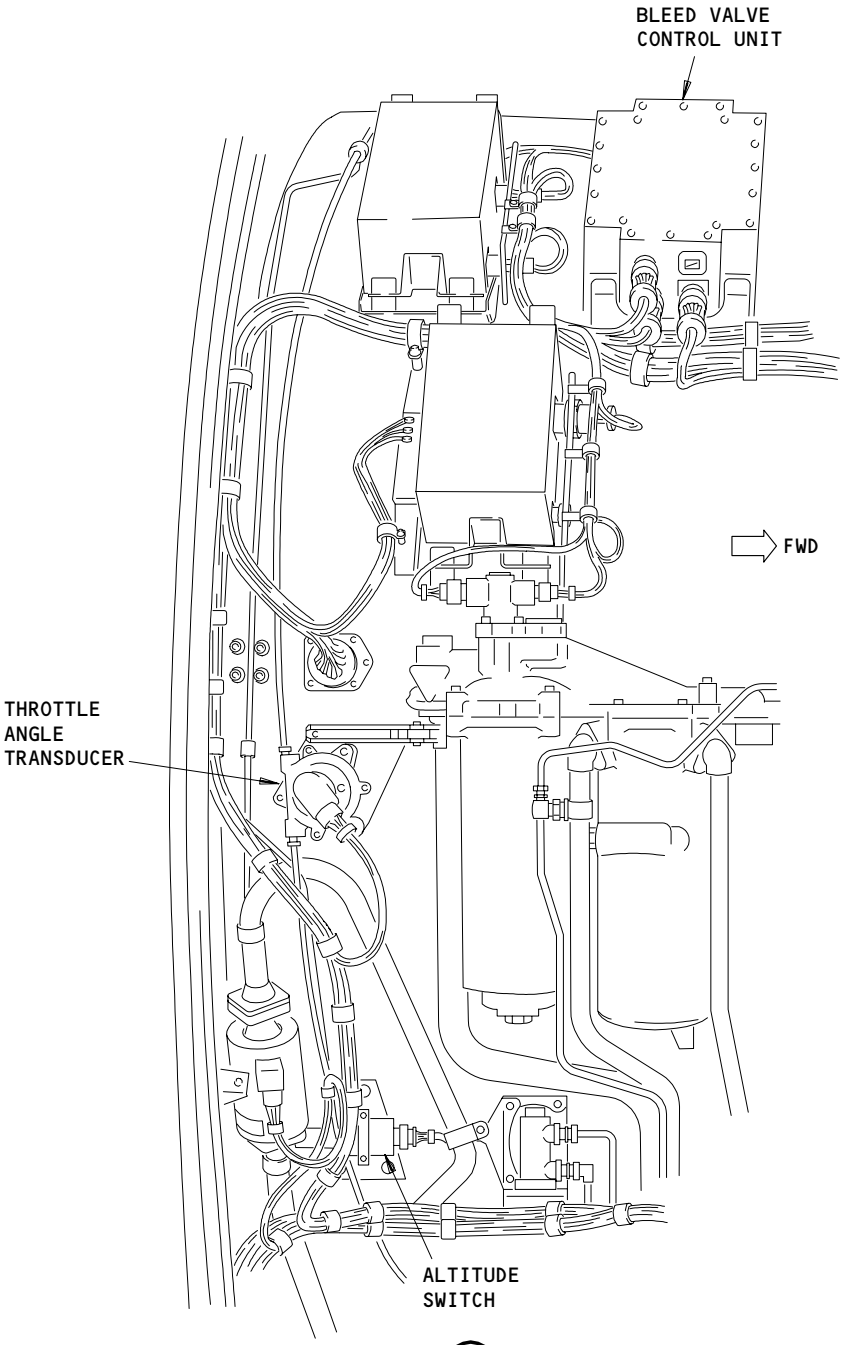
Location of Bleed System Units (Left Side View)
Figure 1 (Sheet 2)

EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-9

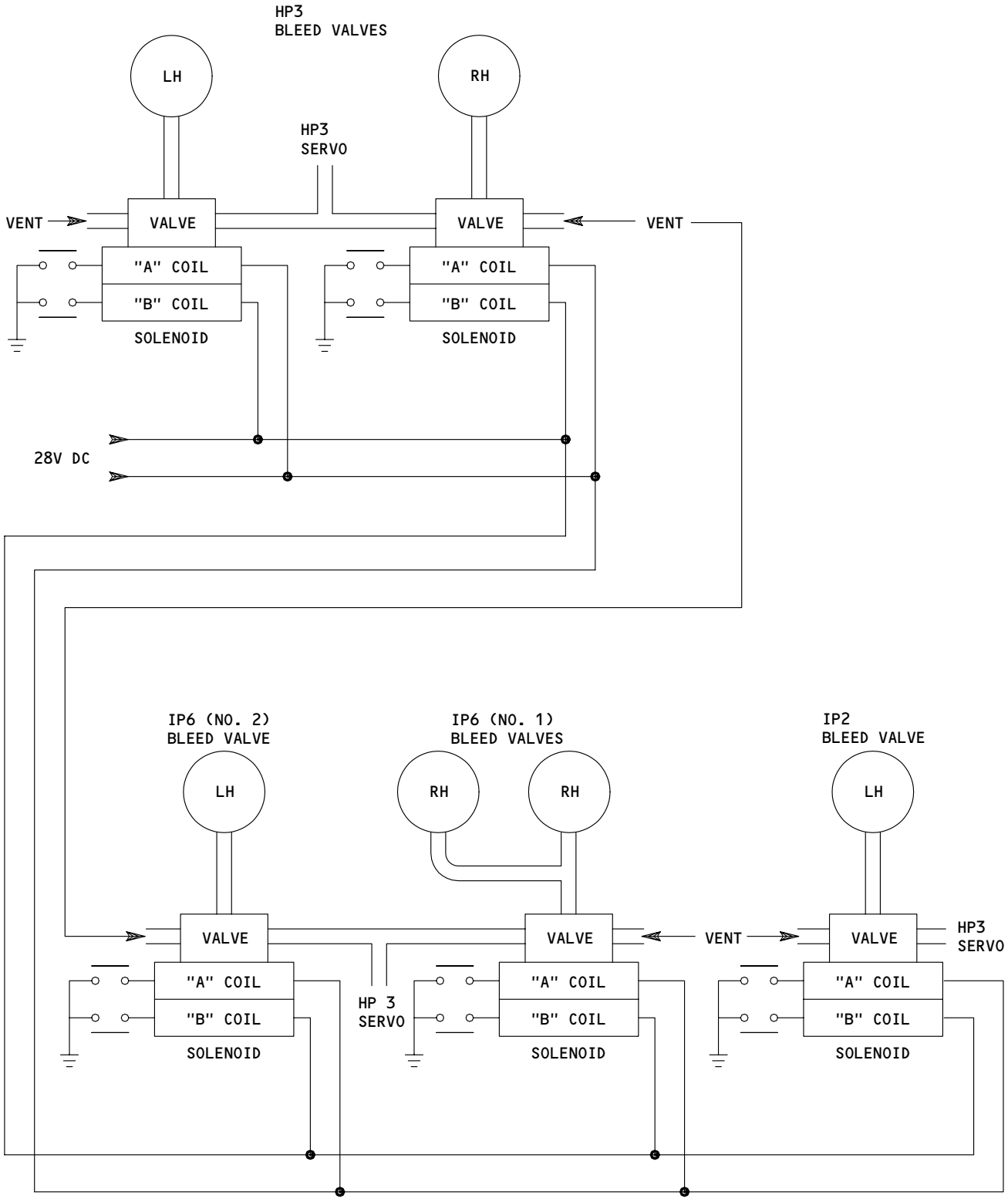
276059



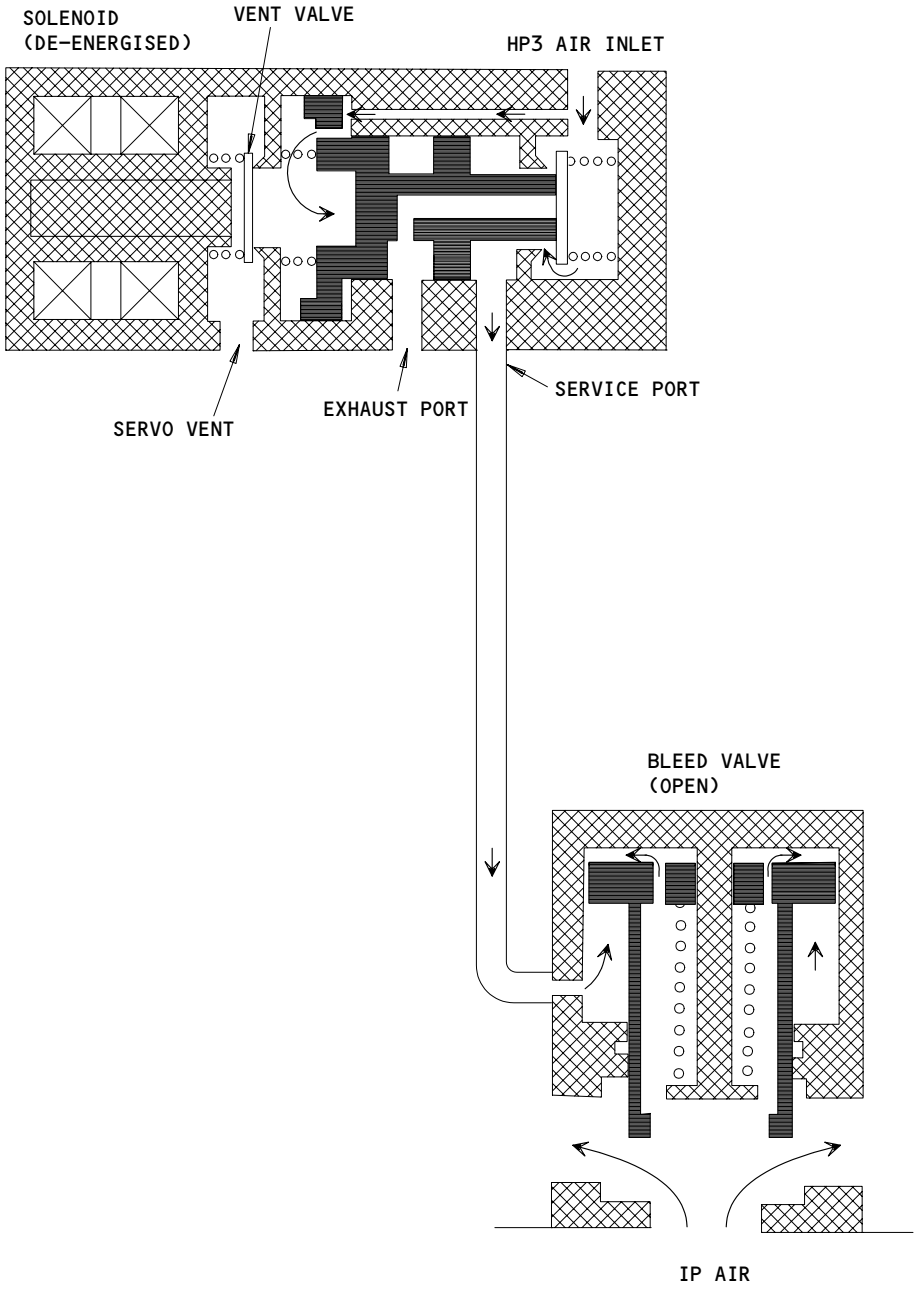
Location of Bleed System Units (Right Side View)
Figure 2 (Sheet 1)



Location of Bleed System Units (Right Side View)
Figure 2 (Sheet 2)



Bleed Valve System Schematic
Figure 3



65297A

IP Compressor Bleed Valve Control
Figure 4

(c) Each unit operates such that with the solenoid energized and the engine in operation, the servo vent is open. HP3 air is released from behind the spring loaded piston and the piston moves against the spring which permits the inlet value to close. The service port is connected to the exhaust port which permits the bleed valve service line pressure to decrease. In this condition the bleed valve is closed.

B. HP Compressor Bleed Valve System

(1) The HP bleed valve system (Fig. 5) includes one HP2 and two HP3 bleed valves and three solenoids. The HP3 bleed valves are mounted on the combustion outer case, one on the upper right-hand side and the other on the lower left-hand side. The HP3 bleed valve solenoids are mounted on the lower left-hand side of the LP compressor case, adjacent to the start control valve. The upper (No. 1) solenoid controls the left-hand bleed valve and the lower (No. 2) controls the right-hand bleed valves.

(2) The HP2 bleed valve is mounted toward the rear of the compressor intermediate case, above the horizontal center line. The associated solenoid is mounted on the lower left-hand side of the LP compressor case, above the IDG cooler.

(3) HP2 and HP3 bleed solenoids are operated independently through the BVCU.

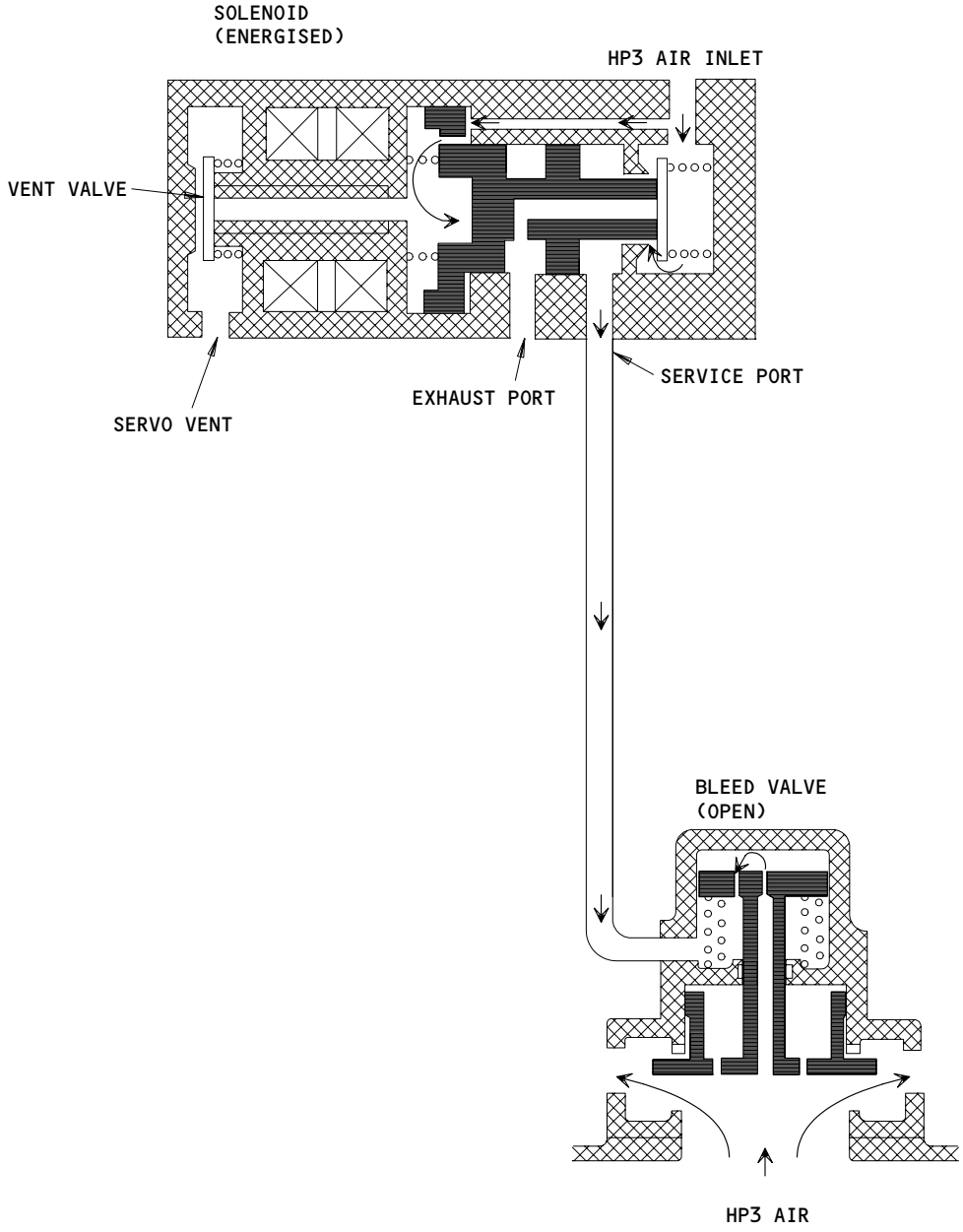
(4) HP Compressor Bleed Valves

(a) Each bleed valve consists of a spring loaded, hollow stemmed, valve and piston assembly operating within a valve body to open or close ports in the combustion outer case. Seals on the piston and body form two chambers; the upper chamber is open to HP3 air fed through the hollow stem; the lower chamber is served by HP servo air supplied from the applicable bleed valve solenoid.

(b) The position of the valve and piston assembly is controlled by either pressurizing or venting the lower chamber as determined by the schedule of the applicable solenoid.

(5) HP Bleed Valve Solenoids

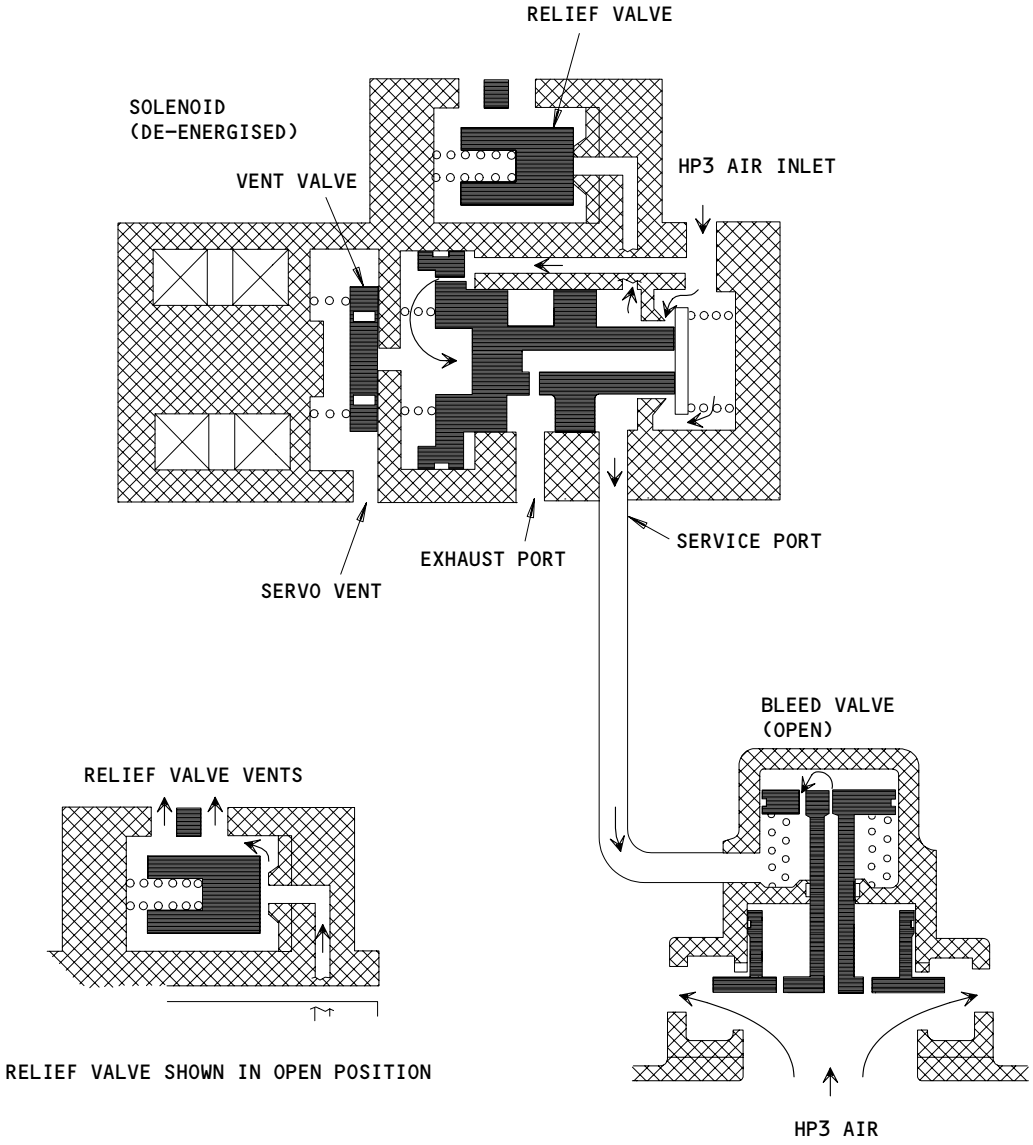
(a) Each solenoid consists of two separate coils (A and B), and a spring loaded valve assembly operating within a body incorporating two tube connections and a vent port. The tube connections are linked by external tube, one to the HP servo manifold and the other to the lower chamber of the bleed valve.



HP3.2 AND HP2 SOLENOID

65298A

HP Compressor Bleed Valve Control
Figure 5 (Sheet 1)



HP3.1 SOLENOID

93448A

HP Compressor Bleed Valve Control
Figure 5 (Sheet 2)

(b) The HP2 and HP3.2 units operate such that with the solenoid energized (as shown in Fig. 5) and the engine in operation, the servo vent is closed. HP3 air is felt at the air inlet, and the pressure increases behind the spring loaded piston which holds the inlet valve in the open position. This permits air to go through the air inlet and be felt at the service port and the bleed valve lower chamber. In this condition the HP bleed valve is open.

(c) The HP3.1 solenoid, when not energized, puts the servo vent in the closed position, and opens the bleed valve. This feature makes sure that if there is an electrical power failure at low power adjustments the HP3.1 bleed valve will open the same as in the first step.

(d) The HP2 and HP3.1 units operate such that with the solenoid not energized, and the engine in operation, the servo vent is open. HP3 servo air is released from behind the spring loaded piston, which allows the piston to move against its spring, and the inlet valve to close. The service port is connected to the exhaust port which allows the bleed valve service line pressure to decrease. In this condition the HP bleed valve is closed.

(e) The HP3.1 solenoid is energized to put the servo vent in the open position and close the bleed valve.

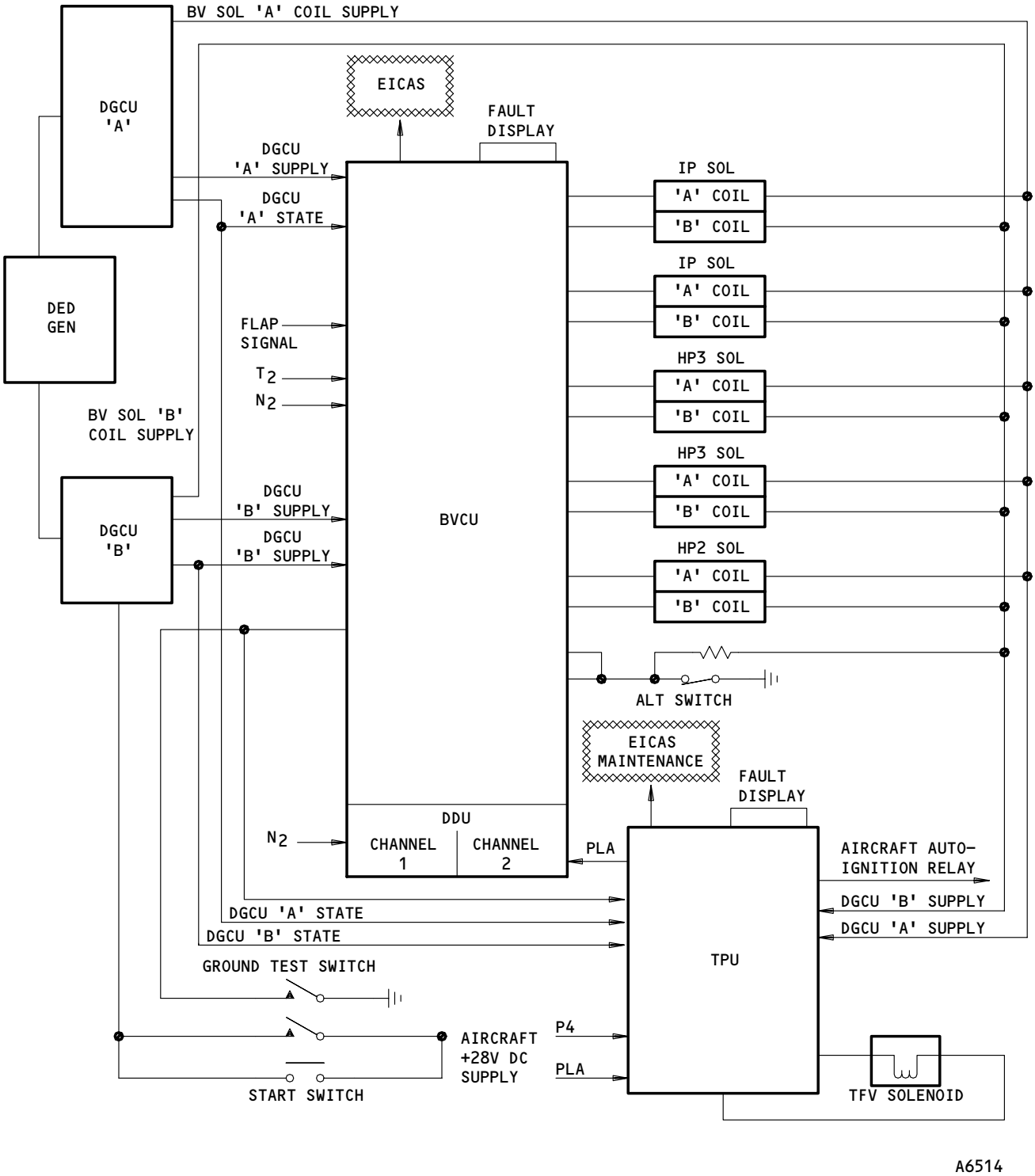
(f) The upper HP3.1 bleed valve solenoid has a relief valve, the function of which is to pneumatically override the solenoid valve and close the bleed valve. The relief valve operates on a pressure differential and is not altitude compensated. Consequently, its operation is altitude limited to 7,500 feet.

(g) The relief valve feature is used on the HP3.1 solenoid only, because of the requirements for the operation of the deceleration detector unit (DDU), given in the DDU operation step.

C. Bleed Valve Control Unit (BVCU) (Fig. 6 and Fig. 7)

(1) To schedule bleed valve operation, the solenoids are sequenced electronically by a compressor bleed valve control unit (BVCU), mounted on the upper right-hand side of the LP compressor case.

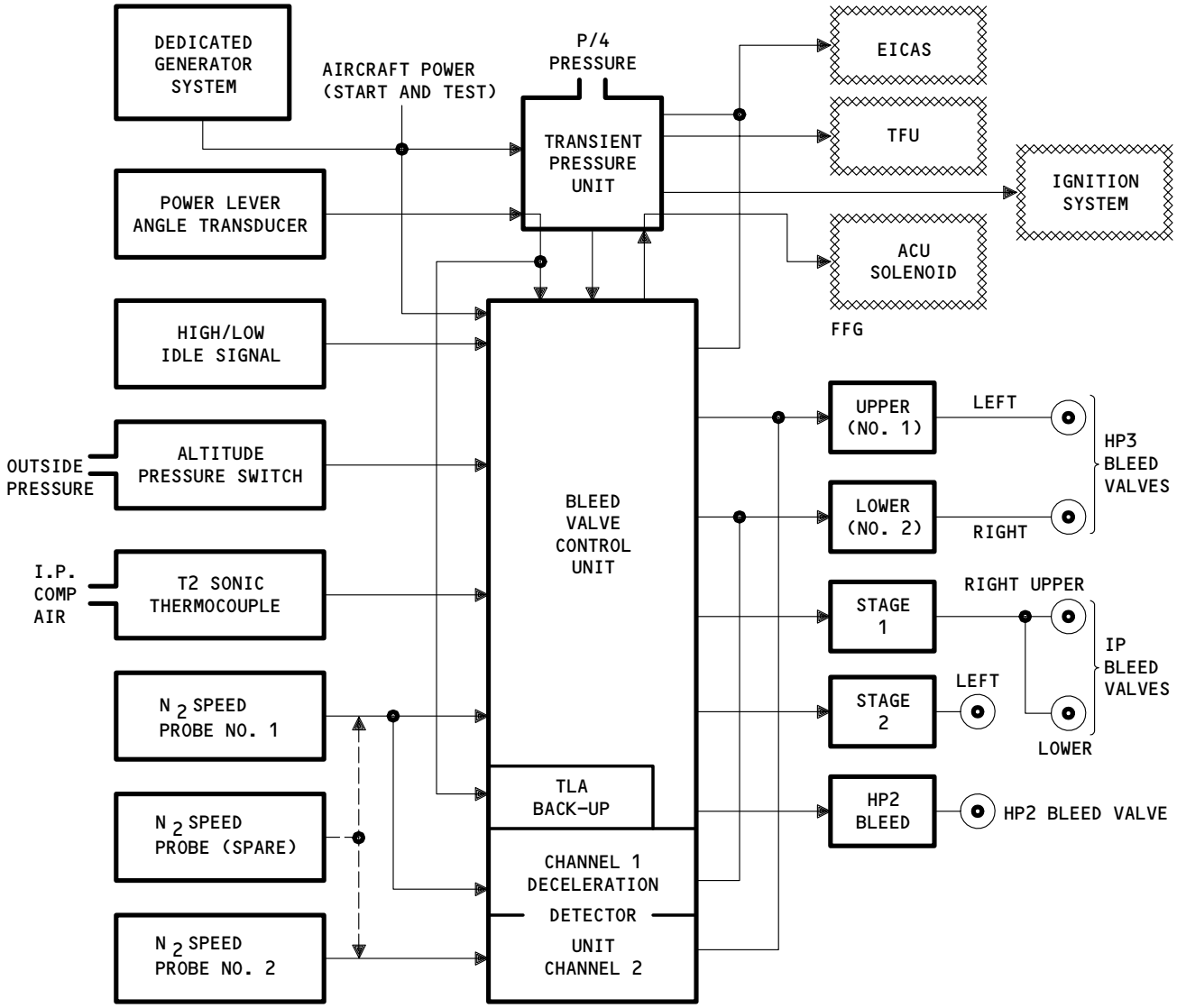
(2) Control of the bleed valves is exercised by the control parameter N2/√T2, derived from IP compressor speed (N2) and IP compressor inlet temperature (T2), to form the basis for the switching schedule.



BVCU Electronic Circuit Functional Diagram
Figure 6

EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-9

735976



Compressor Bleed Valve Control
Figure 7

(3) The control unit also receives inputs of power lever angle, measured by a rotary position transducer mounted on the right-hand side of the LP compressor case, and operated through the engine controls. Rotation of the unit produces two electrical signals that are directly proportional to the angular position of the fuel flow governor input lever. One signal is transmitted to the BVCU, and the second signal is transmitted to the thrust management system (AMM 22-33-00/001).

(4) All input signals are processed within the control unit to produce drive voltage outputs to the bleed valve solenoids.

(5) Normal scheduling of bleed valve operation is affected by rate of change and displacement of throttle angle or N2/√T2 above given values, identifies transient engine conditions. In such conditions, the HP3 and IP bleed valves will be rescheduled to operate at higher N2/√T2 values during acceleration and deceleration, i.e. close later during acceleration and open earlier during deceleration, or until engine stabilizes at a steady state N2/√T2 condition. At altitude above approximately 16,000 feet, the transient switching point for HP3 bleed valves is further increased through the action of the altitude switch.

(6) The normal operating schedule for IP first stage bleed valves is switched to higher N2/√T2 values when altitude exceeds approximately 18,000 feet. During transient engine conditions, IP bleed valve sequence is changed such that, with both rescheduled to higher N2/√T2 values, first stage closure is effected earlier in the sequence than second stage.

(7) Engine handling is further improved by phase advance, when all bleed valve operations are signalled earlier than the scheduled switch points during deceleration. The more rapid the deceleration, the earlier the valves are signalled to open.

(8) AIRPLANES PRE-SB 757-75-005;
The BVCU has a fault monitoring system controlled by a microprocessor. The system monitors faults that occur in the control unit and with external sensors. Fault detection is signalled to the Engine Indicating and Crew Alerting System (EICAS), and is displayed as a STATUS or MAINTENANCE message. Faults are also stored in the BVCU fault memory and shown on a two digit display when the BVCU ground test switch is selected to BVCU. The switch is located on the master junction block on the right-side of the engine. When the engine is started, the fault monitoring system does a test routine to check for dormant failures. Any fault found while the engine is running is shown as a STATUS or MAINTENANCE message on the EICAS display.

(a) When the BVCU has found a dispatch critical fault in the bleed valve control system, the message L(R) ENG SURGE CONT is shown on the EICAS STATUS page. In addition, the message L(R) ENGINE SURGE BITE is shown on the EICAS MAINTENANCE page.

(9) AIRPLANES WITH SB 757-75-0005;
The BVCU has a fault monitoring system controlled by a microprocessor. The system monitors faults that occur in the control unit and with external sensors. Fault detection is signalled to the Engine Indicating and Crew Alerting System (EICAS), and is displayed as a MAINTENANCE message. Faults are also stored in the BVCU fault memory and shown on a two digit display when the BVCU ground test switch is selected to BVCU. The switch is located on the master junction block on the right-side of the engine. When the engine is started, the fault monitoring system does a test routine to check for dormant failures. Any fault found while the engine is running is shown as a MAINTENANCE message on the EICAS display.

(a) When the BVCU has found a fault in the bleed valve control system that is not dispatch critical, the message L(R) ENGINE SURGE BITE is shown on the EICAS display MAINTENANCE page.

D. Deceleration Detector Unit (DDU)

(1) The DDU is an integral part of the BVCU. Its function is to provide automatic control of the HP3 bleed valves in the event of abnormal deceleration of the engine at high power settings, as may be caused by a bird strike. The DDU is capable of signalling both HP bleed valves open for a limited period should N2 exceed a rate of deceleration recognized as a surge.

(2) The DDU consists of two completely independent channels, each operating one HP3 solenoid, and each with its own N2 speed probe. This arrangement safeguards against HP3 bleed valves remaining permanently open in the event of DDU malfunction.

E. Transient Pressure Sensor Unit (TPU)

(1) The TPU is attached to anti-vibration mountings on the lower left-hand side of the low pressure compressor case. The ground test switch on the TPU is given for interrogation of the TPU (AMM 73-21-00/001). The TPU monitors and controls compressor surge, which is not monitored by the DDU at low power adjustments.

(2) The P4 air pressure is delivered to the TPU via an external tube, from a tapping in the P4 air tube to the fuel flow governor. There are two electrical connections on the unit; one for the main inputs and outputs, and the other for test connection.

(3) The TPU is a digital control system except for the analogue processing at the P4 signal, and all output control signals are switched by sealed relays.

(4) A comprehensive fault monitoring system is incorporated which interfaces with aircraft Engine Indication and Crew Alerting System (EICAS), to display a maintenance message to the flight crew. Faults are also stored in the TPU internal memory, and may be recalled as a code on a two-digit hexidecimal display, on the forward face of the unit, by operating the ground test switch (AMM 75-32-00/001).

(5) When a fault is found in the TPU, the message L(R) ENGINE SURGE BITE is shown on the MAINTENANCE page of the EICAS display.

3. Operation

A. Starting and Low Power Conditions (Low Values of N2/√T2)

(1) The IP bleed valve solenoids are scheduled to allow HP servo air to pressurize the lower chamber of each bleed valve. The bleed valves are held open by servo pressure plus spring pressure acting against IP6 air pressure in the upper chamber.

(2) The HP bleed valve solenoids are scheduled to allow HP servo air to pressurize the lower chamber of each bleed valve. Air pressure across the valve and piston assemblies are equal, and the valves are held open by spring pressure.

B. During Acceleration, at Scheduled Values of Increasing N2/√T2:

(1) At low idle, one HP bleed valve and all IP bleed valves are open. As N2/√T2 increases with increased power in steady state operation, at given values, the BVCU schedules the open HP bleed valve to close.

(2) With further steady state increase in N2/√T2, the bleed valve control unit schedules both IP bleed valve solenoids simultaneously to close the bleed valves. If altitude exceeds approximately 18,000 feet, the altitude switch will delay closure of the first stage bleed valves until a higher N2/√T2 value is reached.

(3) In transient engine condition, the BVCU will delay closure of HP3 and IP bleed valves to higher N2/√T2 values, depending upon rate of change and displacement of throttle angle. In these circumstances, if the altitude exceeds approximately 18,000 feet, the switch point for HP3 valve closure is further increased through operation of the altitude switch.

C. During Deceleration, at Scheduled Values of Decreasing N2/√T2:

(1) As N2/√T2 decreases with decreasing power, in steady state operation, the bleed valve control unit schedules both IP bleed valve solenoids to open the bleed valves.

(2) If altitude exceeds approximately 18,000 feet, the altitude switch will advance the sequence in relation to first stage IP bleed operation, and energize the appropriate solenoid, thus effecting earlier opening of first stage bleed valves.

(3) At somewhat lower N2/√T2 values, the bleed valve control unit schedules one HP bleed valve solenoid to open the bleed valve.

(4) If transient engine conditions are encountered during deceleration, IP and HP3 bleed valve operation will be rescheduled to open the valves earlier. In such conditions, if operating in excess of 18,000 feet altitude, HP3 switching will be further advanced.

D. Deceleration Detector Unit (DDU) Operation

(1) Should a deceleration occur at high power settings where the rate of deceleration is abnormal, as may occur in the event of a surge resulting from a bird strike, control of both HP3 bleed valves is switched to the DDU.

(2) The N2 input signal is a sine wave, the frequency of which is in proportion to engine shaft speed. This signal is monitored by the DDU. If there is an unusual deceleration, the DDU will cancel the normal control of the BVCU, and schedule the HP3 bleed valve solenoids to open the bleed valves.

(3) The bleed valves will be scheduled open for a period of approximately 23 seconds to assist engine recovery.

(4) In high power and low altitude conditions, opening both HP bleed valves may have a detrimental affect on turbine cooling air flow. To protect the engine from this condition, the HP3.1 bleed valve solenoid features a relief valve, which when open causes the associated bleed valve to close.

(5) In the above conditions, HP servo air pressure opens the relief valve, thereby venting the solenoid valve. This causes the bleed valve to close.

E. Transient Pressure Sensor Unit (TPU) Operation

(1) In the event of a compressor surge at low power settings, such as may occur following a bird strike, the TPU takes corrective control action to allow the engine to recover.

(2) The engine parameter used to detect compressor surge is high pressure compressor delivery pressure (P4). However, in order to establish a surge parameter independent of altitude, a computed value of rate of change of P4 divided by P4 is compared to a reference value.

(3) During normal engine operation, the computed value is greater than the reference value and the TPU system is de-energized. If the computed value falls below the reference value, the TPU recognizes this as the onset of compressor surge.

(4) When the TPU detects a surge, it transmits corrective control signals to the BVCU, transient fuel valve (TFV), and to the ignition system.

(5) The control signals produce the following actions:

(a) A relay in the TPU disconnects the power lever angle signal to the BVCU, which automatically selects all bleed valves to the transient mode.

(b) After a delay of 0.5 seconds to allow the bleed valves to fully open, the TPU energizes the TFV solenoid to reduce fuel flow to the fuel spray nozzles (AMM 73-21-00/001).
(c) Continuous ignition (AMM 74-31-00/001) is selected by the TPU.

NOTE: Selection of the bleed valves to the transient schedule is latched for the remaining flight. The bleed valves are automatically set to steady state operation at the next engine start.

Selection of fuel dip and continuous ignition is reset automatically after a timed period to allow for the possibility of multiple surges.

COMPRESSOR BLEED CONTROL SYSTEMS - DESCRIPTION AND OPERATION

1. General
   A. This procedure has two tasks:
      (1) A description of the compressor bleed control system.
      (2) An operation of the compressor bleed control system.
   B. To keep a stable airflow through the compressor section during certain transient and steady running conditions, a percentage of air is vented from the intermediate pressure (IP) and high pressure (HP) compressors. This is achieved through six bleed valves: three venting IP compressor stage 6 (IP6) air, two venting HP compressor stage 3 (HP3) air, and one venting HP stage 2 (HP2) air. All bleed valves discharge to LP compressor (fan) outlet pressure.
   C. The bleed valves are controlled through five solenoids. Two IP solenoids control two bleed valves and one bleed valve, respectively. The two HP3 and one HP2 bleed valves are controlled through individual solenoids.
   D. IP and HP solenoids are operated in sequence by an electronic compressor Bleed Valve Control Unit (BVCU). The BVCU senses IP compressor speed (N2). IP compressor inlet temperature (T2), and thrust lever position (Pilot Lever Angle). The bleed valves are controlled as a function of N2/√T2. The schedule is affected by rate of change of thrust lever position, measured by a throttle angle transducer, and N2/√T2. An altitude switch senses ambient pressure and feeds a signal to the BVCU to alter the N2/√T2 value at which the bleed valves close above a predetermined altitude.
   E. To ensure positive and stable operation, the bleed valves are scheduled so that valve closure during acceleration, is effected at a higher N2/√T2 value, than that at which they open during deceleration.
   F. In the event of failure of either N2 or T2 signal to the BVCU, when the ratio of N2/√T2 would be affected to higher or lower limits, depending upon which signal failed; scheduling of IP and HP bleed valves is provided through a back-up system, whereby bleed valves are controlled as a function of throttle angle. The back-up schedule represents an approximation of N2/√T2 schedule.
   G. During engine start, electrical power to the BVCU and the HP solenoids is provided from the aircraft system. When the engine reaches a speed at which the dedicated generator (AMM 73-21-00/001) comes on line, the BVCU and all solenoids are powered through the dedicated generator.
   H. ENGINES WITHOUT SB 75-C737 OR SB 75-C796;
      The IP bleed valves and the HP3.1 bleed valve will open and stay open when in the failure mode, at low power, with no electrical power to the solenoids. The remaining HP bleed valves will close and stay closed. At power settings above the HP3.1 relief valve blow-off point, the HP valves will close and stay closed to prevent excessive loss of take-off power.

I. ENGINES WITH SB 75-C737 OR SB 75-C796;
The IP bleed valves and the HP2 and HP3.1 bleed valves will open and stay open in failure mode, at low power, with no electrical power to the solenoids. This will leave only the HP3.2 bleed valve closed. At power settings above HP3.1 and the HP2 relief valve blow-off point, the HP bleed valves will close and stay closed to prevent excessive loss of take-off power.

J. A deceleration detection unit (DDU) which is integral with the BVCU, has the capability to set both HP3 bleed valves to open should N2 exceed a rate of deceleration at high power settings (surge). The HP3 bleed valves will remain open for a predetermined period, sufficient to allow the engine to recover from the surge condition.

K. The transient pressure sensor unit (TPU) is designed to detect the onset of compressor surge at low power settings, particularly in the event of compressor damage by bird ingestion, and take corrective control action to allow the engine to recover. The engine parameter used to detect compressor surge is HP compressor delivery pressure P4.

L. ENGINES WITH SB 75-C796 AND SB 75-C823 (TRANSIENT PRESSURE SENSOR UNIT ETPU-300);
To prevent the possibility of an IP compressor surge at high altitudes and low operating conditions, the Transient Pressure Sensor Unit (TPU) commands the IP6.2 bleed valve to open, via a P30 (P4) control valve when at pressures below 86.5 psia. In the event of the IP6.2 bleed valve being open at this condition, the TPU/P30 (P4) control valve prevents IP6.2 closure. The opening of the IP6.2 bleed valve results in an increase in the IP compressor surge margin.

M. Fig. 1 shows the location of the system units and Fig. 2 shows the system schematic.

2. Description of the Compressor Bleed Control System (Fig. 1 and 2)

A. IP Compressor Bleed Valve System

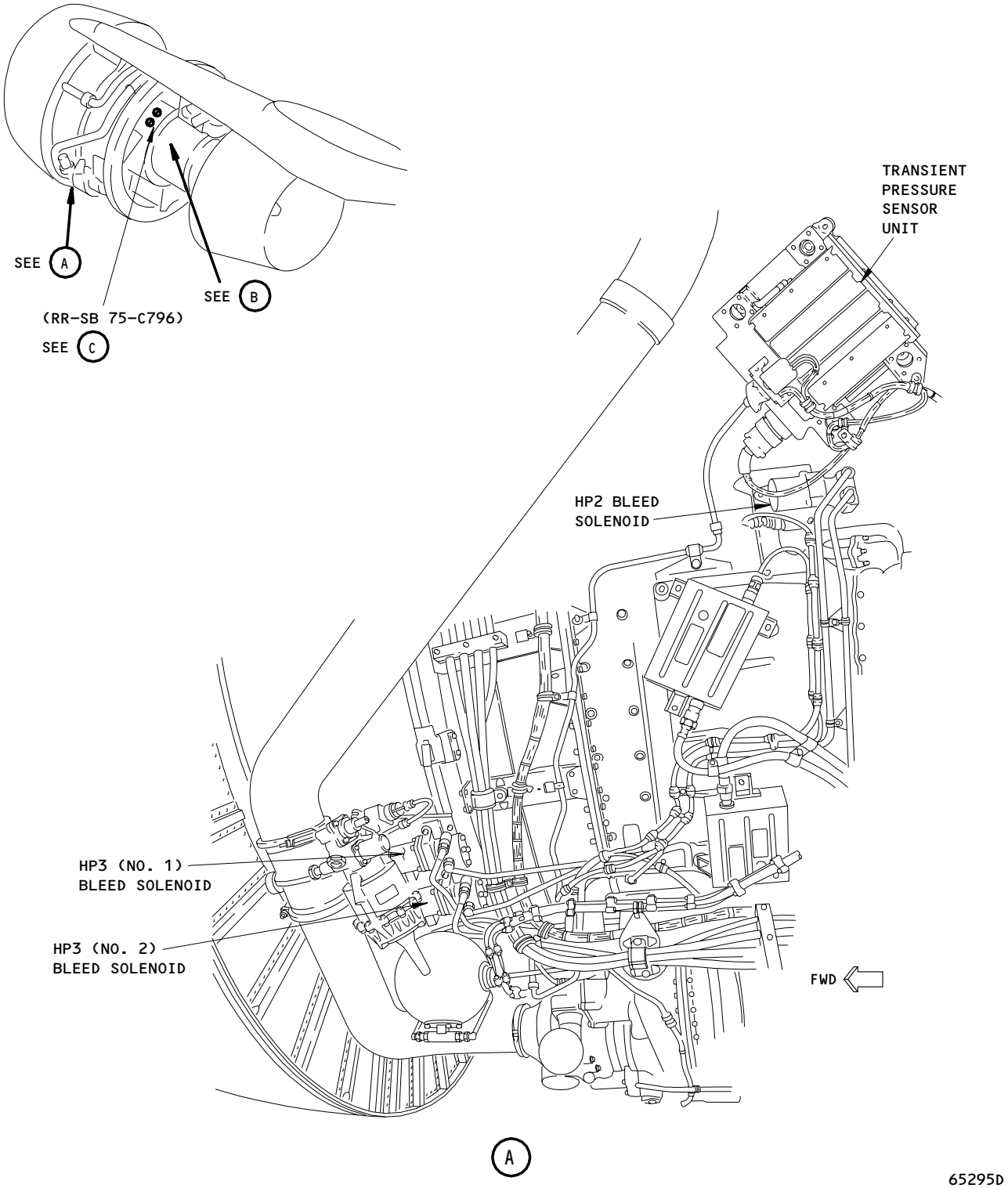
(1) The IP bleed valve system has three bleed valves and two solenoids. The bleed valves are mounted around the IP compressor, two on the right-hand side, identified as No. 1 (first stage), and one on the left-hand side identified as No. 2 (second stage). The IP solenoids are mounted on the front face of the gas generator panel support, on each side of the splitter nose fairing. The right-hand solenoid operates the No. 1 bleed valve(s), and the left-hand solenoid operates the No. 2 bleed valve.
For engines with SB 75-C796 there is the addition of a P30 control valve and a revised IP 6.2 solenoid valve. The P30 control valve is situated on the left-hand generator fairing support panel which is adjacent to the IP 6.2 solenoid valve (IP6 (No. 2) Bleed Valve Solenoid).

(2) The IP solenoids are sequenced, through the BVCU, to close all IP bleed valves simultaneously during steady state acceleration conditions, except at altitudes above 18,000 feet . Above 18,000 feet, first stage bleed valve closure is switched to a higher N2/√T2 value, through the action of the altitude switch.
For engines with SB 75-C796 at values of P30 air pressure above 86.5 psia, the IP 6.2 solenoid valve is sequenced via the BVCU as described above. At values of P30 air pressure below 86.5 psia, the IP 6.2 solenoid is commanded open via the P30 Control Valve.

(3) IP Compressor Bleed Valves
  (a) Each bleed valve has a spring loaded cylindrical valve and piston assembly, which operates within a valve body, to open or close ports in the compressor case. Seals on the piston and body form two chambers; the upper chamber is open to IP6 air through holes in the piston and the lower chamber is served by HP servo air supplied through the appropriate IP solenoid.
  (b) The position for the valve and piston assembly is controlled by either venting or pressurizing the lower chamber, as determined by the schedule of the applicable solenoid.

(4) IP Bleed Valve Solenoids
  (a) Each solenoid has two separate coils (A and B), and a spring-loaded valve assembly within a body, incorporating two tube connections and a servo vent port. The tube connections are linked, by external tube, one to the HP3 air manifold and the other to the bleed valve lower chamber.

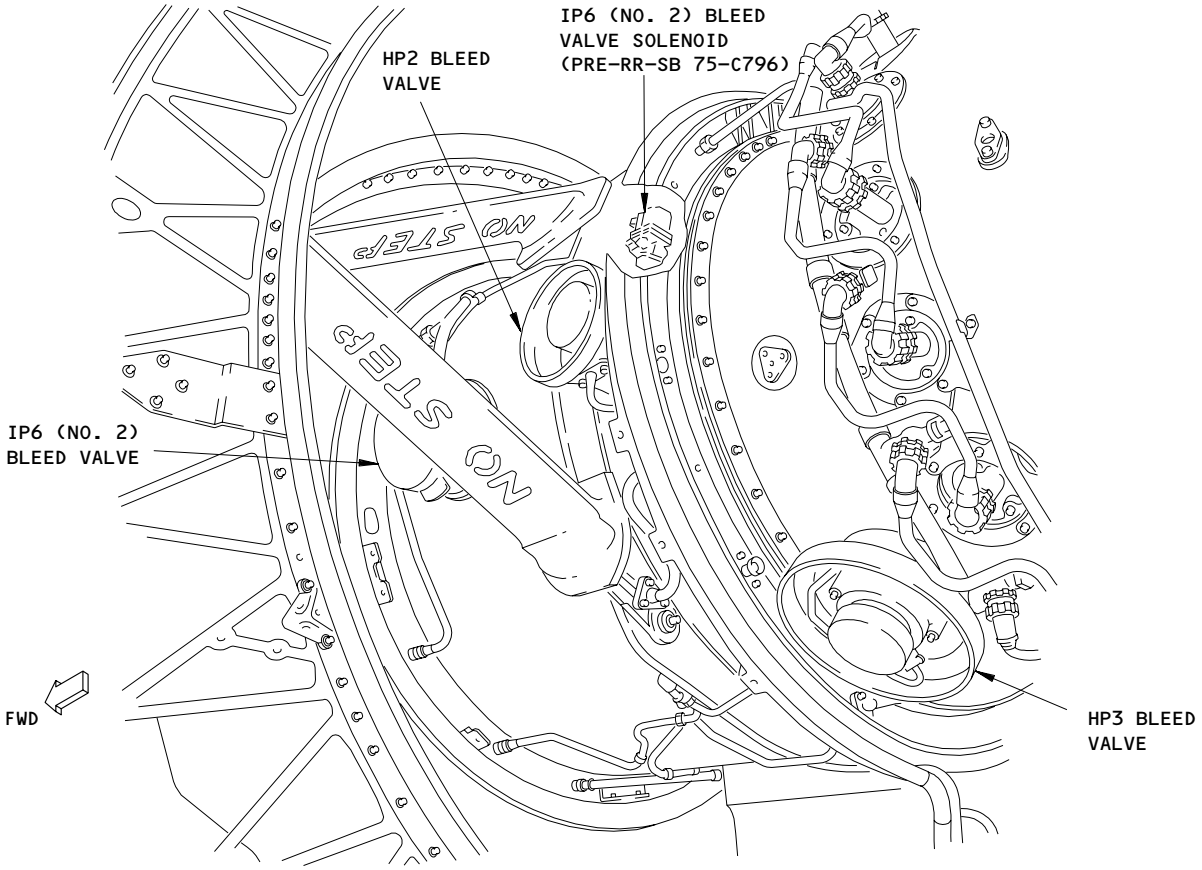
(5) P30 Control Valve engines with SB 75-C796
  (a) The P30 Control Valve has two separate coils (A and B). A spring-loaded valve assembly operates within a body, incorporating one tube connection and a vent port. The tube connection is linked to the IP6.2 solenoid valve.
  (b) When the solenoid is not energized and the engine is running, the P30 Control Valve will vent, which in turn allows the IP6.2 solenoid valve to vent. In this state, the IP6.2 operation is via the existing bleed valve schedule.
  (c) The P30 Control Valve closes the vent and causes a buildup of pressure within the valve when the solenoid is energized and the engine is running. This build up of pressure within the valve pressurizes the vent area within the IP6.2 solenoid valve, which causes the piston to assume the position it would normally take when the IP6.2 valve was de-energized. The result is that the bleed valve is held open.
  (d) When the solenoid is not energized (Fig. 3), and the engine is running, the servo vent is closed. HP3 air is felt at the air inlet, and pressure builds up behind the spring-loaded piston which holds the inlet valve in the open position. This permits air to pass through the air inlet and to be felt at the service port and at the bleed valve lower chamber. In this condition the bleed valve is open.



Location of Bleed System Units (Left Side View)
Figure 1 (Sheet 1)

EFFECTIVITY
RB211-535E4 WITH BVCU C8E38-11, C8E38-12, OR C8E38-15

F11694



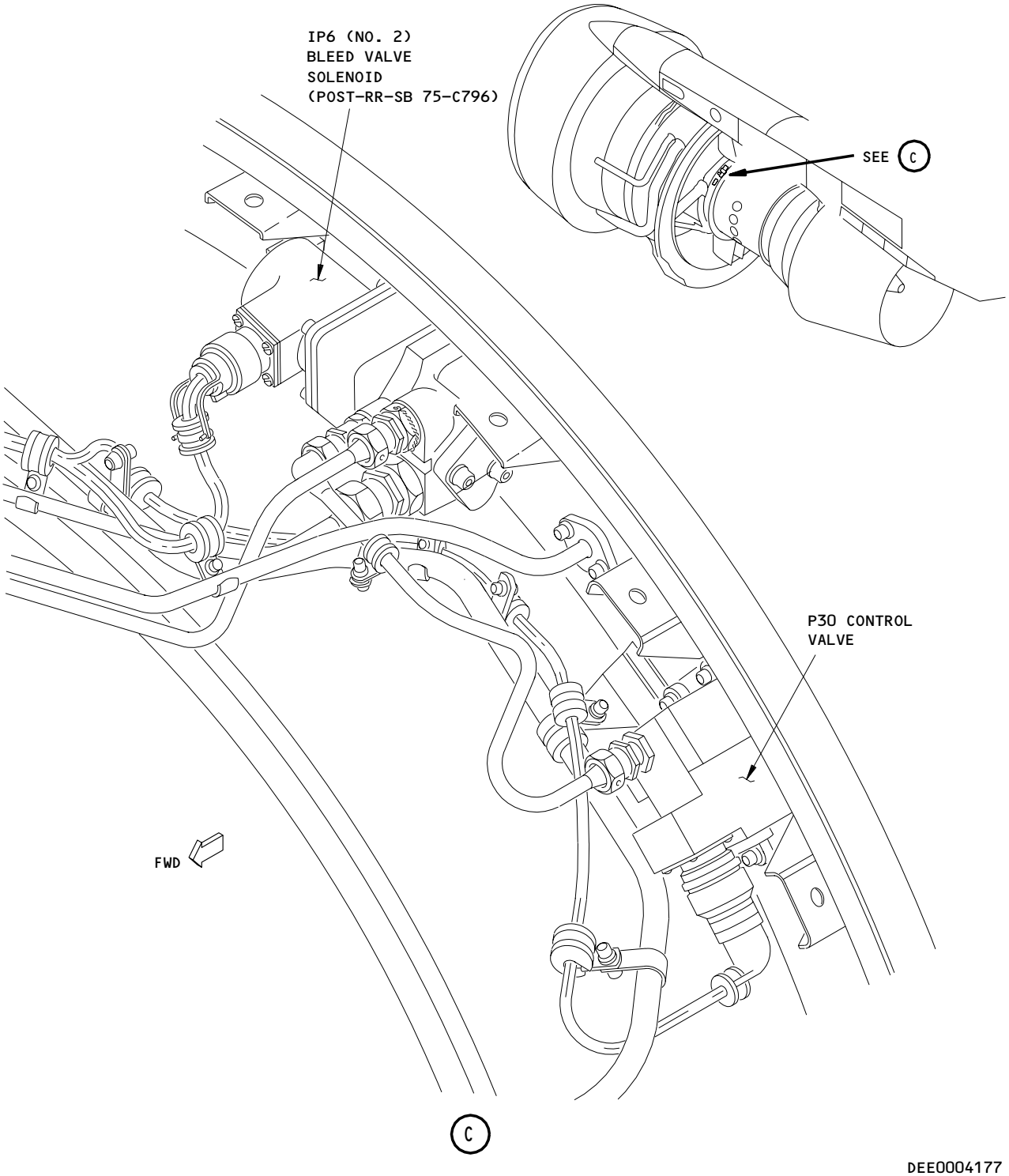
VIEW IN THE FORWARD DIRECTION
SHOWING ANGULAR POSITION OF BLEEDS

A6645

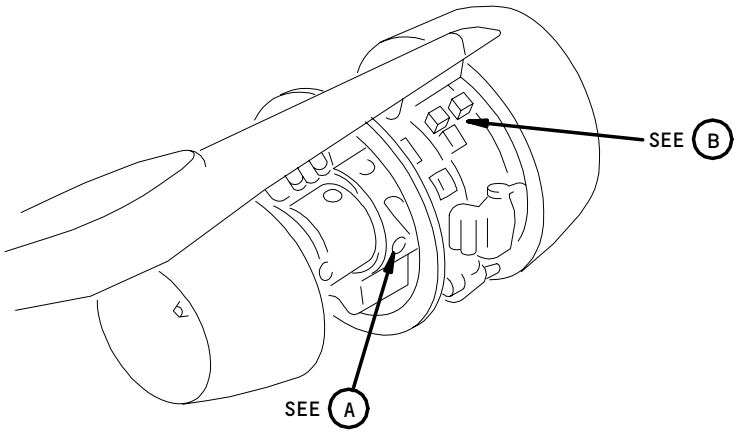
Location of Bleed System Units (Left Side View)
Figure 1 (Sheet 2)

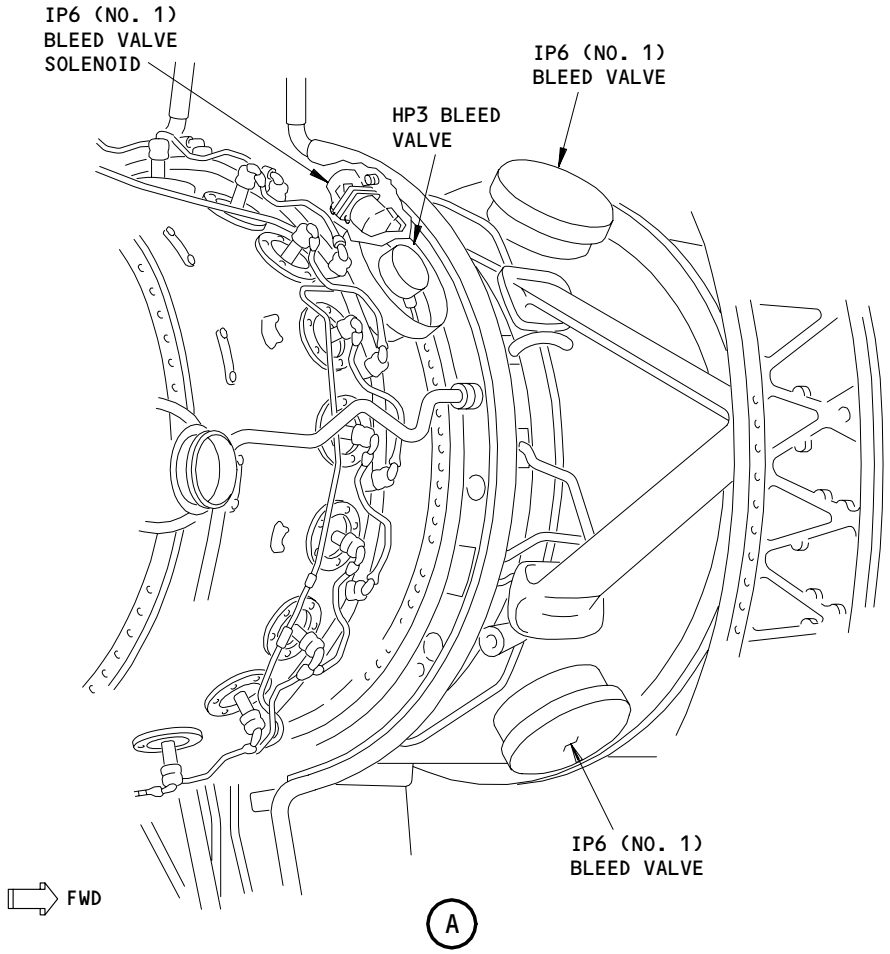
EFFECTIVITY
RB211-535E4 WITH BVCU C8E38-11, C8E38-12, OR C8E38-15

F11698



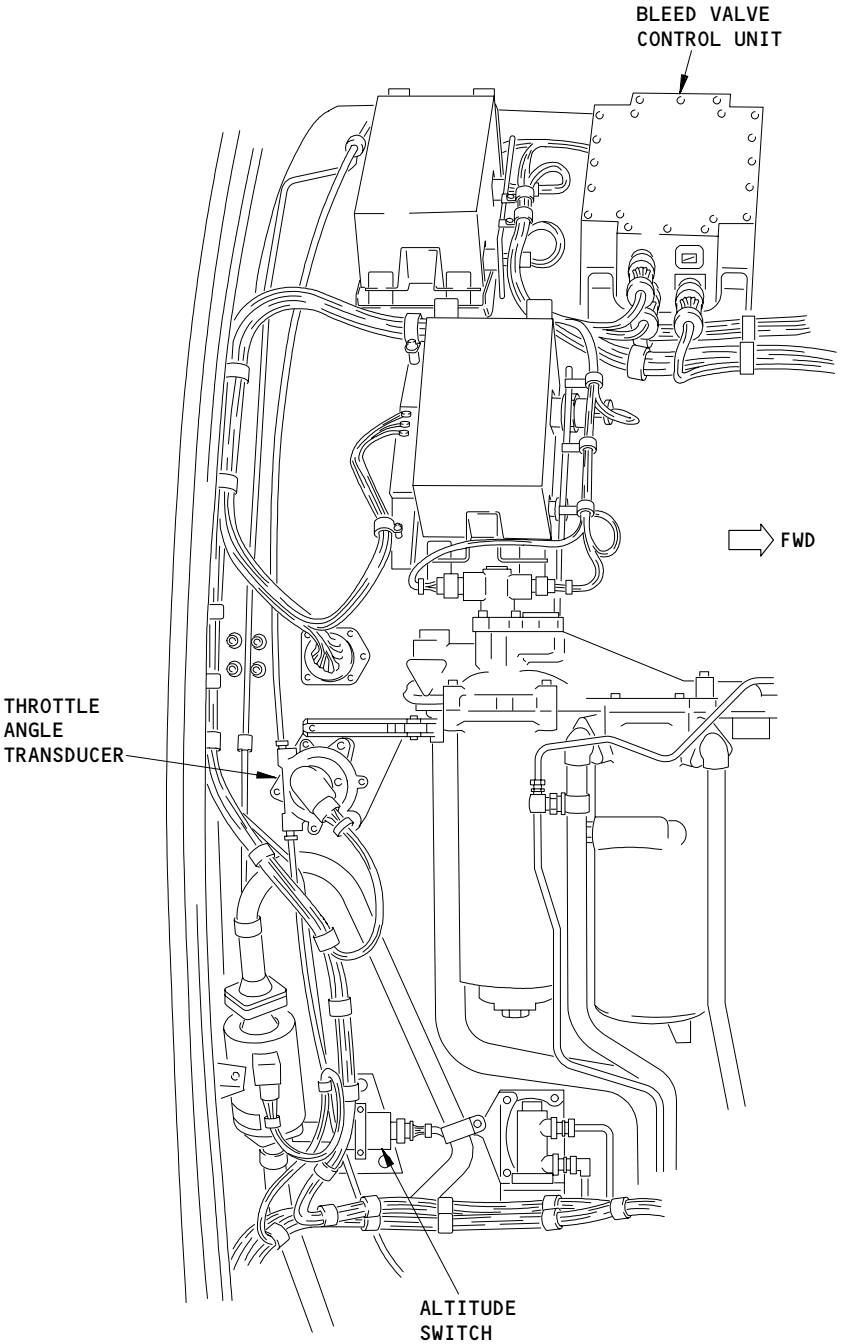
Location of Bleed System Units (Left Side View)
Figure 1 (Sheet 3)





65296A

Location of Bleed System Units (Right Side View)
Figure 2 (Sheet 1)



Location of Bleed System Units (Right Side View)
Figure 2 (Sheet 2)

(e) With the solenoid energized and the engine running, the servo vent is open. HP3 air is released from behind the spring loaded piston which permits the piston to move against its spring and the inlet valve to close. The service port is connected to the exhaust port and permits the bleed valve service line pressure to decrease. In this condition the bleed valve is closed.

B. HP Compressor Bleed Valve System

(1) The HP bleed valve system has two HP3 and one HP2 bleed valves, and three solenoids. The HP3 bleed valves are mounted on the combustion outer case. One valve is on the upper right-hand side and the other is on the lower left-hand side. The HP3 bleed valve solenoids are mounted on the lower left-hand side of the LP compressor case, adjacent to the start control valve. The upper (No. 1) solenoid controls the left-hand bleed valve and the lower (No. 2) controls the right-hand bleed valves.

(2) The HP2 bleed valve is mounted toward the rear of the compressor intermediate case, above the horizontal center line. The associated solenoid is mounted on the lower left-hand side of the LP compressor case, above the IDG cooler.

(3) HP2 and HP3 bleed solenoids are operated independently through the BVCU.

(4) HP Compressor Bleed Valves

(a) Each bleed valve has a piston assembly which is spring-loaded and hollow-stemmed. The valve body opens or closes ports in the combustion outer case. Seals on the piston and the body form two chambers; the upper chamber which is open to HP3 air fed through the hollow stem, and the lower chamber which is served by HP servo air supplied from the appropriate bleed valve solenoid.

(b) The position of the valve and piston assembly is controlled by either pressurizing or venting the lower chamber, as determined by the appropriate solenoid's schedule.

(5) HP Bleed Valve Solenoids

(a) Each solenoid has two separate coils (A and B), and a spring-loaded valve assembly within a body, which has two tube connections and a servo vent port. The tube connections are linked by an external tube; one to the HP servo manifold and the other to the lower chamber of the bleed valve.

(b) ENGINES WITHOUT SB 75-C737 OR SB 75-C796;
The servo vent is closed on the HP2 and HP3.2 units when the solenoid is energized (Fig. 4) and the engine is running.

(c) ENGINES WITH SB 75-C737 OR SB 75-C796;
On the HP3.2 unit, when the solenoid is energized, and the engine is running, the servo vent is closed. HP3 air is felt at the air inlet, and then the pressure builds up behind the spring-loaded piston which holds the inlet valve in the open position. This allows air to pass through the air inlet, and to be felt at the service port and at the bleed valve lower chamber. In this condition the HP bleed valve is open.

(d) ENGINES WITHOUT SB 75-C737 OR SB 75-C796;
The HP3.1 solenoid, when not energized, puts the servo vent in the closed position, thereby opening the bleed valve. This feature makes sure that in the event of an electrical power failure, at low power settings, the HP3.1 bleed valve will open (as previously described in par.1).

(e) ENGINES WITH SB 75-C737 OR 75-C796;
The HP3.1 and HP2 solenoids, when not energized, put the servo vents in the closed position, and therefore open the bleed valves. This feature makes sure that in the event of an electrical power failure at low power settings, the HP2 and HP3.1 bleed valves will open (as previously described in paragraph 1).

(f) ENGINES WITHOUT SB 75-C737 OR SB 75-C796;
The HP2 and HP3.2 units' servo vents are open when the solenoid is not energized and the engine is running.

(g) ENGINES WITH SB 75-C737 OR SB 75-C796;
The HP3.2 units' servo vent is open when the solenoid is not energized and the engine is running. HP3 servo air is released from behind the spring-loaded piston, holding the inlet valve in the open position. This allows air to pass through the air inlet, and to be felt at the service port, thereby also at the bleed valve lower chamber. In this condition the HP bleed valve is open.

(h) ENGINES WITHOUT SB 75-C737 (BVCU PART NO. C8E38-14) OR SB 75-C796 (BVCU PART NO. C38E38-15) OR SB 72-C230 (PHASE V COMBUSTOR);
The HP3.1 solenoid is energized to put the servo vent in the open position and therefore close the bleed valve.

(i) ENGINES WITH SB 75OC737 (BVCU PART NO. C8E38-14) OR SB 75-C796 (BVCU PART NO. C38E38-15) OR SB 72-C230 (PHASE V COMBUSTOR);
The HP2 and HP3.1 solenoids are energized to put the servo vents in the open position and therefore close the bleed valves.

(j) ENGINES WITHOUT SB 75-C737 OR SB 75-C796;
The upper HP3.1 bleed valve solenoid features a relief valve, the function of which is to pneumatically overide the solenoid valve and close the bleed valve. The relief valve operates on a pressure differential and is not altitude compensated, consequently its operation is altitude limited to 7,500 feet.

(k) ENGINES WITH SB 75-C737 OR SB 75-C796;
The upper HP3.1 and HP2 bleed valve solenoids feature a relief valve, the function of which is to pneumatically override the solenoid valve and close the bleed valve. The relief valve operates on a pressure differential and is not compensated, consequently its operation is altitude limited to 7,500 feet.

(l) The relief valve feature is used on one HP3.1 solenoid only. This is due to the requirements for the operation of the deceleration detector unit, described in par. 3.D.

C. Compressor Bleed Valve Control Unit Description

(1) To schedule bleed valve operation, the solenoids are sequenced electronically by a compressor bleed valve control unit (BVCU), mounted on the upper right-hand side of the LP compressor case.

(2) Control of the bleed valves is exercised by the control parameter N2/√T2, derived from IP compressor speed (N2) and IP compressor inlet temperature (T2), to form the basis for the switching schedule.

(3) The control unit receives inputs of thrust lever angle measured by a rotary position transducer, mounted on the right-hand side of the LP compressor case, which is operated through the engine controls. Rotation of the unit produces two electrical signals that are directly proportional to the angular position of the fuel flow governor input lever. One signal is transmitted to the BVCU, and the second signal is transmitted to the thrust management system (AMM 22-33-00).

(4) All input signals are processed within the control unit to produce drive voltage outputs to the bleed valve solenoids.

(5) Normal scheduling of bleed valve operation is affected by N2/√T2. Rate of change and displacement of throttle angle above predetermined values identifies transient engine condition. In such conditions, the HP3 and IP bleed valves will be rescheduled, to operate at higher N2/√T2 values during acceleration and deceleration. During acceleration they will close later, and open earlier during deceleration, or until engine stabilizes at a steady state N2/√T2 condition. At altitude above approximately 18,000 feet, the transient switching point for HP3 bleed valves is further increased through the action of the altitude switch.

(6) The normal operating schedule for IP first stage bleed valves is switched to higher N2/√T2 values when altitude exceeds approximately 18,000 feet. During transient engine conditions, IP bleef valve sequence is changed such that, with both rescheduled to higher N2/√T2 values, first stage closure is effected earlier in the sequence than second stage.

(7) Engine handling is further improved by phase advance, when all bleed valve operations are signalled earlier, than the scheduled switch points during deceleration. The more rapid the deceleration, the earlier the valves are signalled to open.

(8) Deceleration Detector Unit (DDU)

(a) The DDU is an integral part of the BVCU. Its function is to provide automatic control of the HP3 bleed vales in the event of abnormal deceleration of the engine at high power settings, as may be caused by a bird strike. The DDU is capable of schedule both HP bleed valves open for a limited period should N2 exceed a rate of deceleration recognized as a surge.

(b) The DDU comprises two completely independent channels, each operating one HP3 solenoid and each with its own N2 speed probe. This arrangement safeguards against both HP3 bleed valves remaining permanently open in the event of DDU malfunction.

(9) BVCU Fault Monitoring

(a) Incorporated into the BVCU is a comprehensive fault monitoring system, controlled by a micro-processor. The system monitors faults occurring in the control unit, and faults connected with the external sensors.

(b) Fault detection is signalled to the Engine Indication and Crew Alerting System (EICAS), to be displayed as a MAINTENANCE message. A fault code is also stored in the unit fault memory, to be recalled as a two-digit hexadecimal display, when selected by a ground test switch located on the matrix block. This display is viewed through a window in the unit (AMM 75-32-01/201).

(10) Engine Transient Pressure Sensor Unit (TPU)

(a) The TPU is attached to anti-vibration mountings on the lower left-hand side of the LP compressor case when viewed from the rear. A ground test switch is fitted on the TPU and is used for interrogating the functioning of the TPU. The TPU detects and controls the recovery of a compressor surge at low power settings which is not detected by the DDU.

(b) The P4 air pressure is delivered to the TPU via an external tube, from a tapping in the P4 air tube to the fuel flow governor. There are two electrical connections on the unit: one for the main inputs and outputs, and the other being a test connector.

(c) The TPU is a digital control system (except for the analog processing at the P4 signal), and all output control signals are switched by sealed relays.

(d) FOR ENGINES WITH SB 75-C796;
The Engine Transient Pressure Unit (TPU) Part No. ETPU-300-01 contains an additional function to detect the point at which P4 pressure reaches a threshold of 86.5 psia. When the P4 pressure falls below 86.5 psia the TPU energizes a P4 control valve to open. This opens the IP6.2 bleed valve resulting in an increase of the engine surge margin. At pressures above 86.5 psia the P4 control valve is de-energized and bleed valve scheduling is controlled by the BVCU.

(e) A comprehensive fault monitoring system is incorporated which interfaces with aircraft Engine Indication and Crew Alerting System (EICAS) to display a MAINTENANCE message. Faults are also stored in the TPU internal memory and may be recalled as a code on a two-digit hexidecimal display, on the forward face of the unit, by operating the ground test switch (AMM 75-32-01/201).

3. Operation of the Compressor Bleed Control System (Fig. 3, 4, 5, and 6)

A. Starting and Low Power Conditions (Low Values of N2/√T2):

(1) The IP bleed valve solenoids are scheduled to allow HP servo air to pressurize the lower chamber of each bleed valve. The bleed valves are held open by servo pressure plus spring-pressure acting against IP6 air pressure in the upper chamber.

(2) The HP bleed valve solenoids are schedule to allow the HP servo air to pressurize the lower chamber of each bleed valve. Air pressure across the valve and piston assemblies are equal and the valves are held open by spring-pressure.

B. During Acceleration, at Scheduled Values of Increasing N2/√T2:

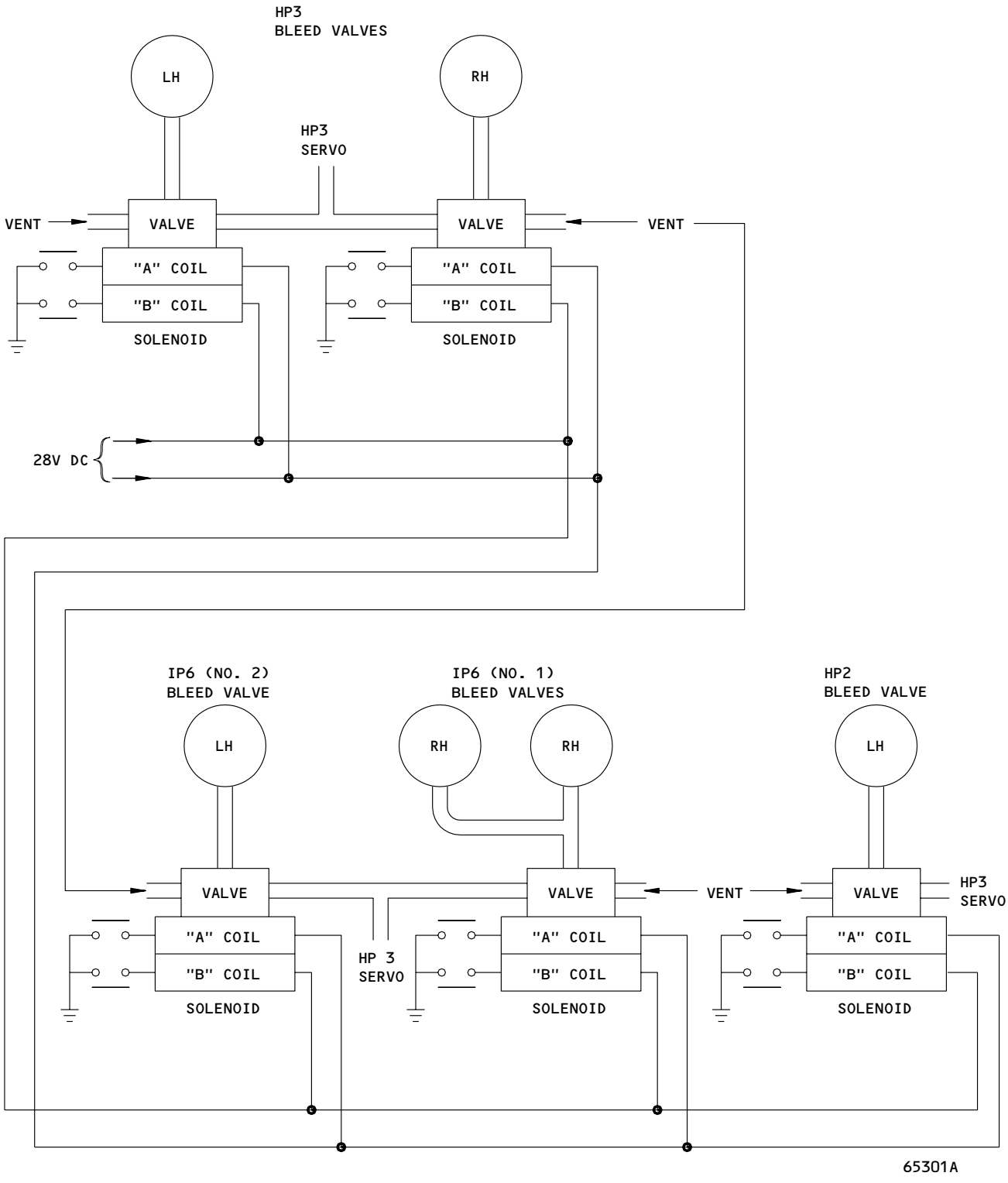
(1) At low idle, one HP bleed valve and all IP bleed valves are open. As N2/√T2 increases with increasing power in steady state operation, at predetermined values the BVCU schedules the open HP bleed valve to closed.

(2) With further steady state increase in N2/√T2, the bleed valve control unit schedules both IP bleed valve solenoids to simultaneously close the bleed valves. If altitude exceeds approximately 18,000 feet, the altitude switch will delay closure of the first stage bleed valves until a higher N2/√T2 value is reached.

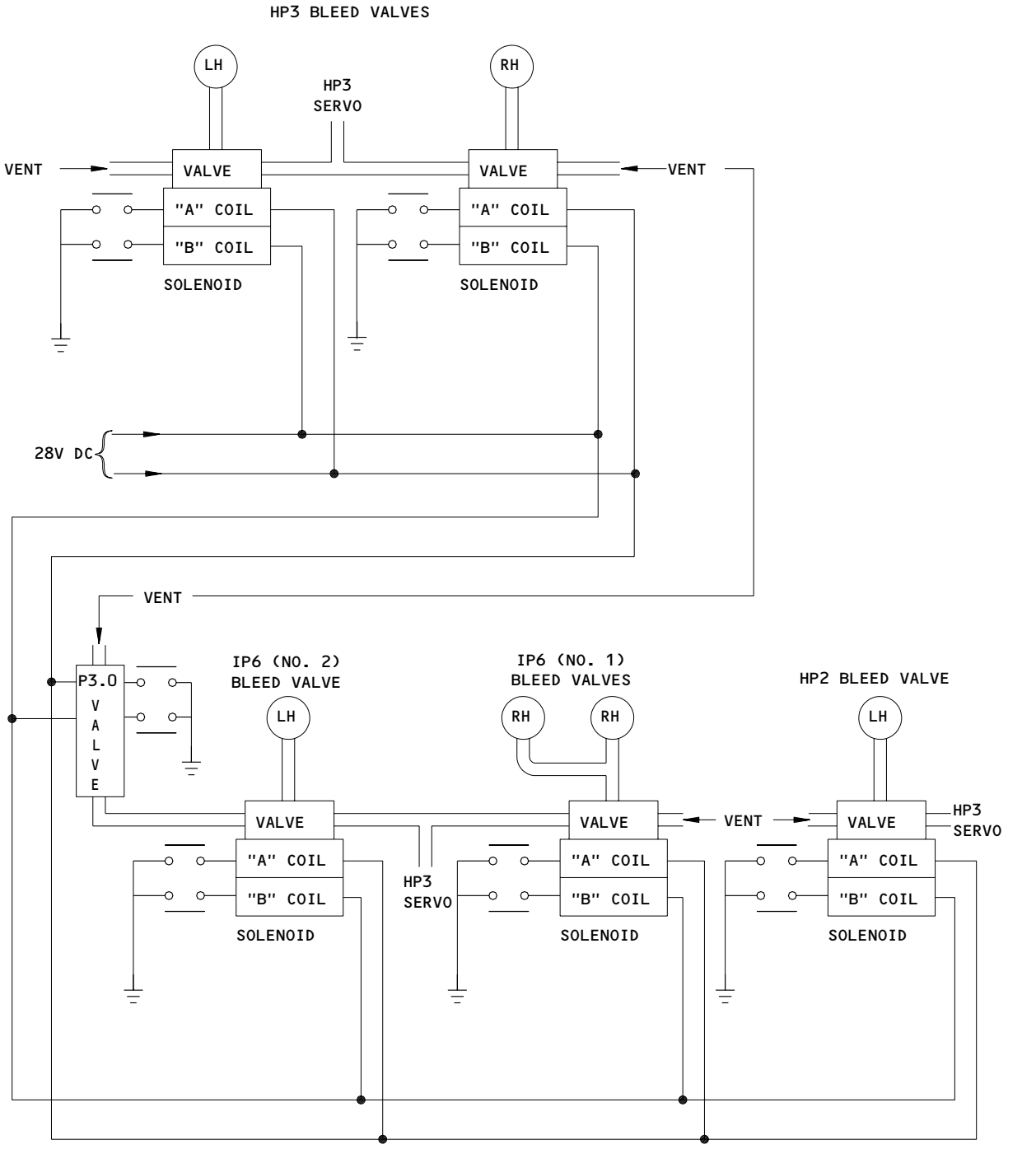
(3) In transient engine condition, the BVCU will delay closure of HP3 and IP bleed valves to higher N2/√T2 values, depending upon rate of change and displacement of throttle angle. In these circumstances, if the altitude exceeds approximately 18,000 feet, the switch point for HP3 valve closure is further increased through operation of the altitude switch.

C. During Deceleration, at Scheduled Values of Decreasing N2/√T2:
(1) As N2/√T2 decreases with decreasing power, in steady state operation, the bleed valve control unit schedules both IP bleed valve solenoids, to open the bleed valves.
(2) If altitude exceeds approximately 18,000 feet, the altitude switch will advance the sequence in relation to first stage IP bleed operation and energize the appropriate solenoid, thus effecting earlier opening of first stage bleed valves.
(3) At somewhat lower N2/√T2 values, the bleed valve control unit schedules one HP bleed valve solenoid to open the corresponding bleed valve.
(4) If transient engine conditions are encountered during deceleration, IP and HP3 bleed valve operation will be rescheduled to open the valves earlier. In such conditions, if operating in excess of 18,000 feet altitude, HP3 switching will be further advanced.

D. Deceleration Detector Unit (DDU) Operation
(1) Should a deceleration occur at high power settings where the rate of deceleration is abnormal (as may occur in the event of a surge resulting from a bird strike), control of the two HP3 bleed valves is switched to the DDU.
(2) The N2 input signal is a sine wave, the frequency of which is proportional to engine shaft speed. This signal is monitored by the DDU. If an abnormal deceleration is sensed, the DDU will override normal control exercised by the BVCU, and schedule the HP3 bleed valve solenoids, to open the corresponding bleed valves.
(3) The bleed valves will be scheduled to open for a period of approximately 23 seconds to assist engine recovery.
(4) FOR ENGINES WITHOUT SB 75-C737 OR SB 75-C796;
In high power and low altitude conditions, opening both HP bleed valves may have a detrimental affect on turbine cooling air flow. To protect the engine from this condition, the HP3.1 bleed valve solenoid features a relief valve, which when open causes the associated bleed valve to close.



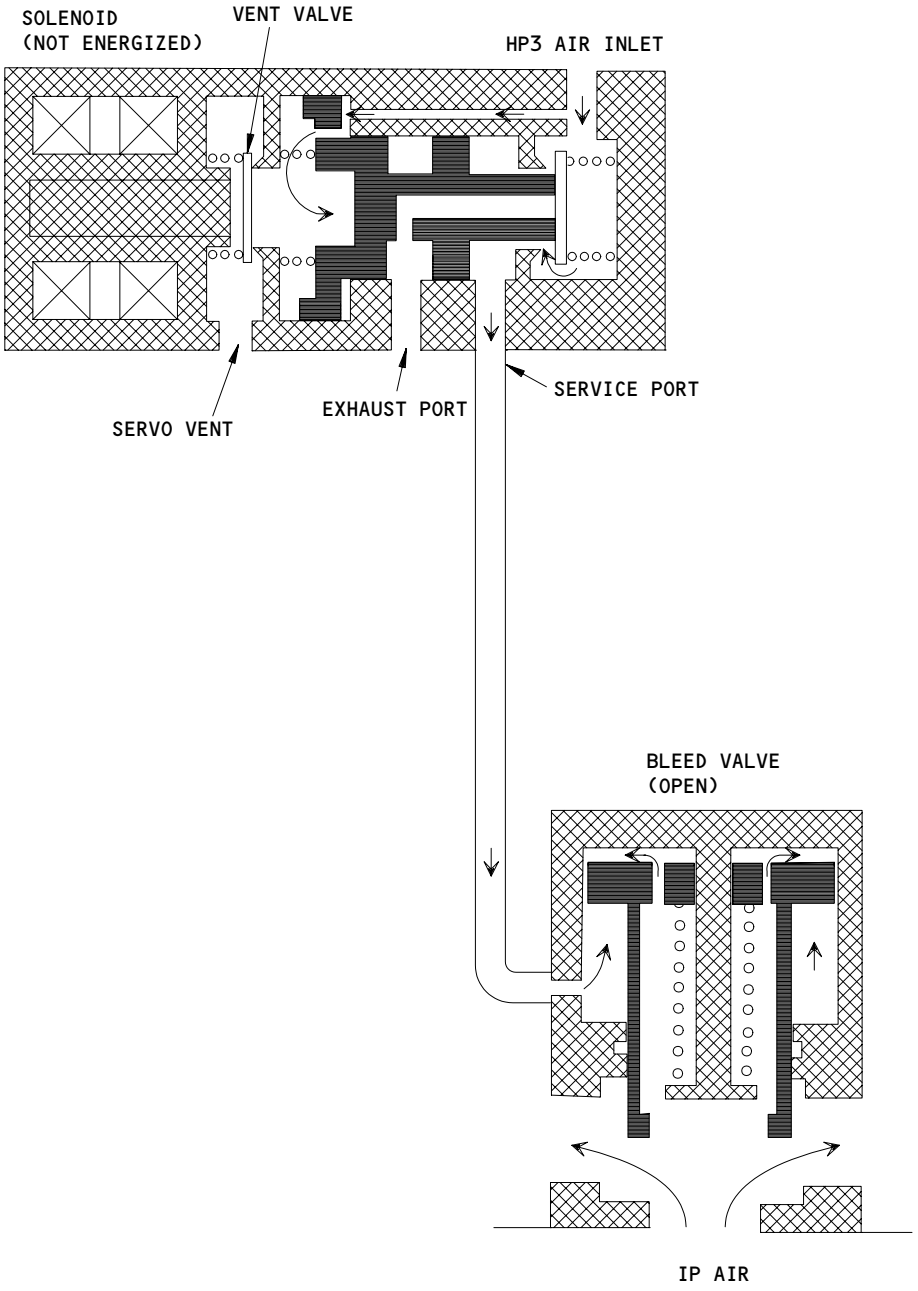
Bleed Valve System Schematic
Figure 3 (Sheet 1)



Bleed Valve System Schematic
Figure 3 (Sheet 2)

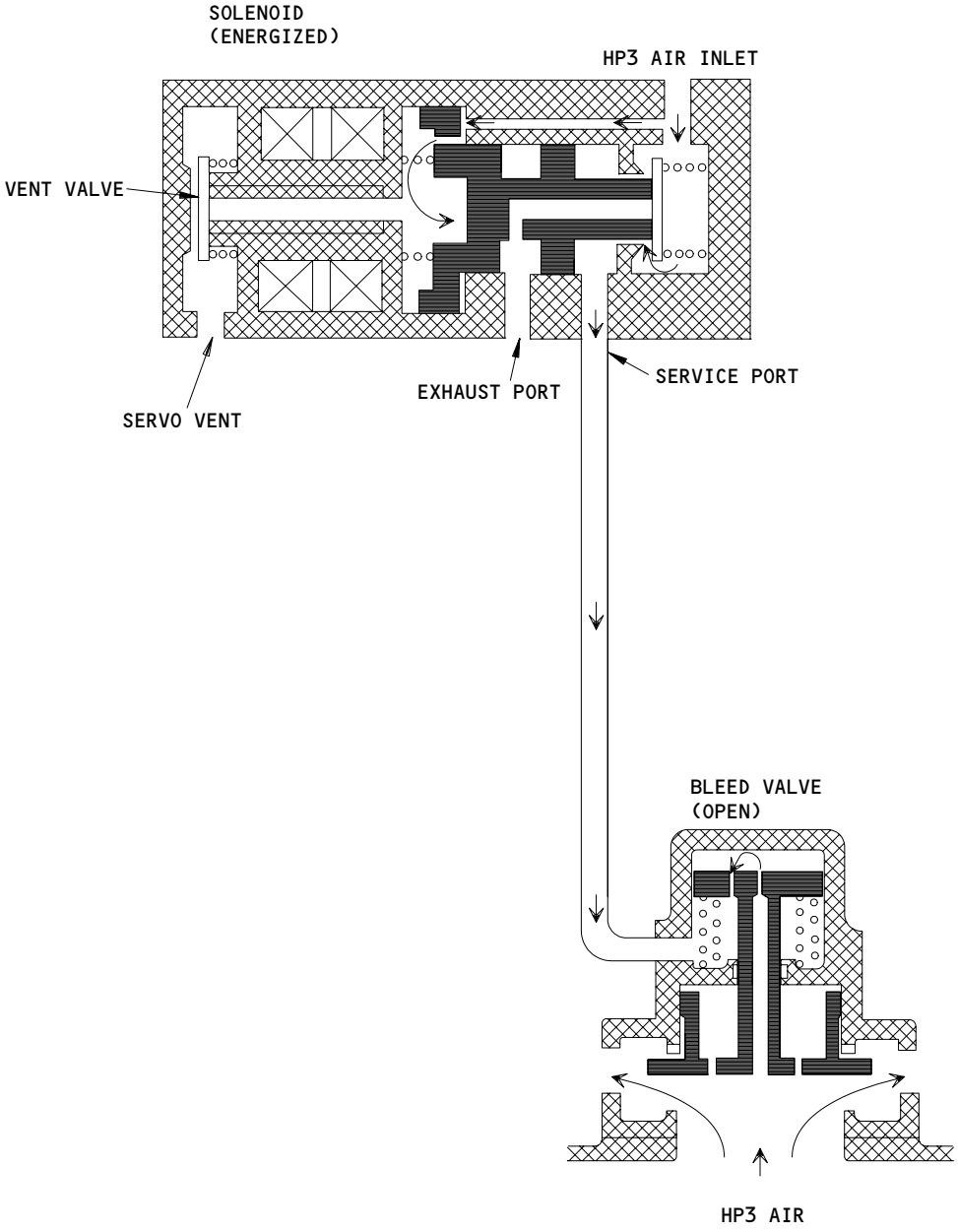
EFFECTIVITY
RB211-535E4 WITH BVCU C8E38-11,
C8E38-12, OR C8E38-15,
POST RR SB 75-C796

M22866



65297A

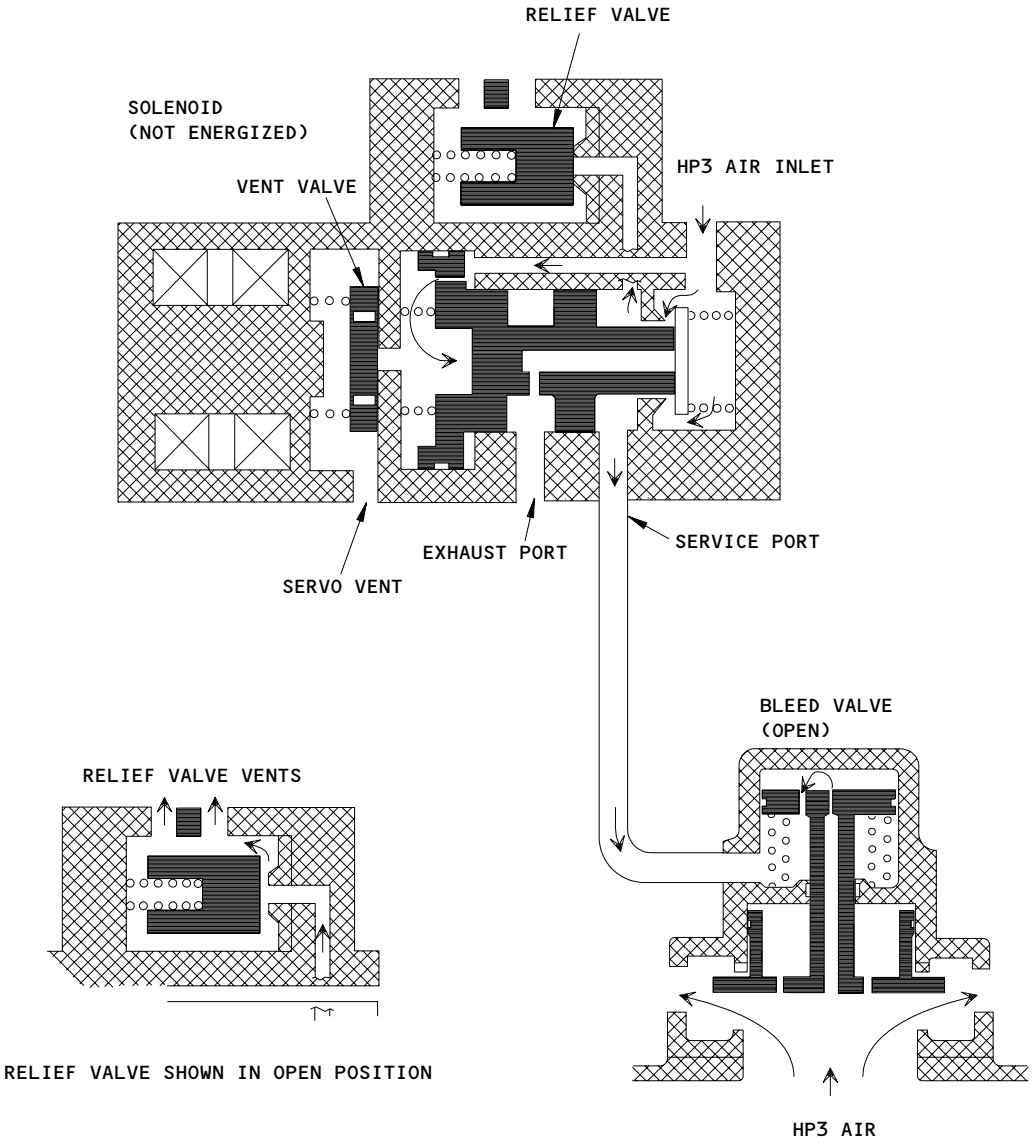
IP Compressor Bleed Valve Control
Figure 4



HP3.2 AND HP2 SOLENOID

65298A

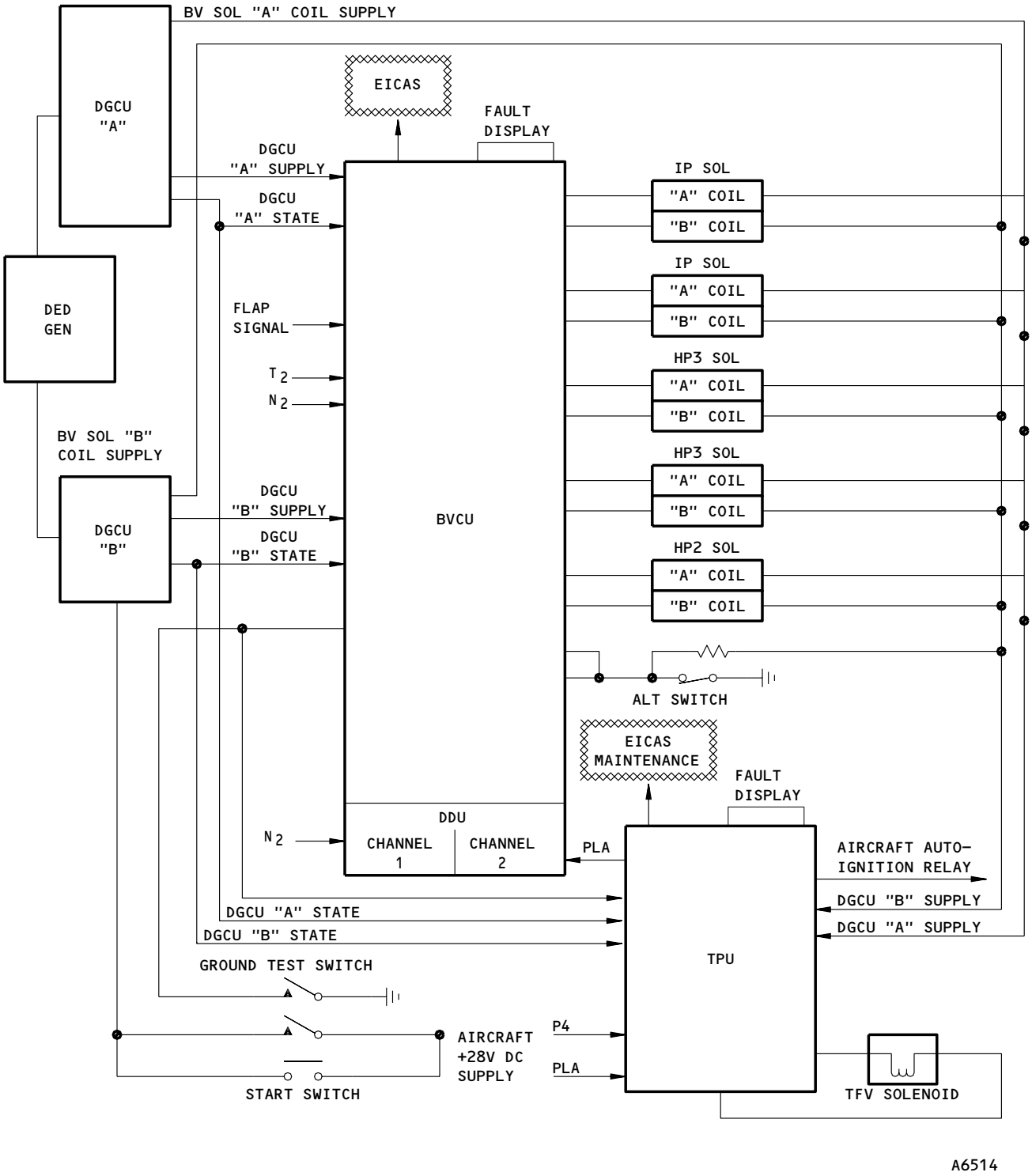
HP Compressor Bleed Valve Control
Figure 5 (Sheet 1)



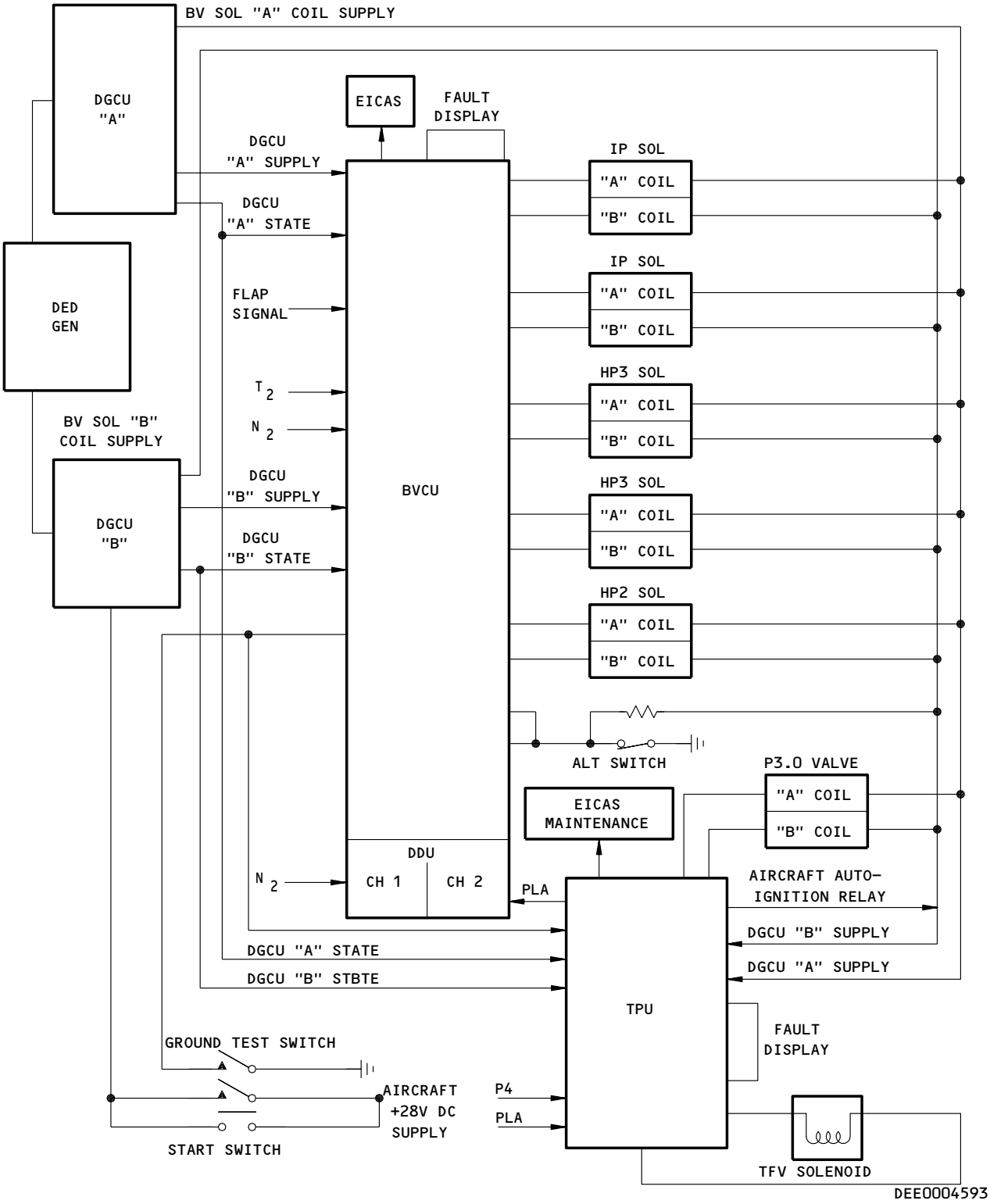
HP3.1 SOLENOID

93448A

HP Compressor Bleed Valve Control
Figure 5 (Sheet 2)



BVCU Electronic Circuit Functional Diagram
Figure 6 (Sheet 1)



BVCU Electronic Circuit Functional Diagram
Figure 6 (Sheet 2)

EFFECTIVITY
ENGINES POST RR SB 75-C796

M22891

(5) FOR ENGINES POST SB 75-C737 OR SB 75-C796;
Open HP2 and HP3.1 bleed valves may have a detrimental effect on turbine cooling airflow if in a high power, low altitude condition. To protect the engine from this condition the HP2 and HP3.1 bleed valve solenoids feature relief valves, which when open cause the associated bleed valves to close.

(6) In the above conditions, HP servo air pressure opens the relief valve, thereby venting the solenoid valve. This causes the bleed valve to close.

E. Engine Transient Pressure Sensor Unit (TPU) Operation

(1) In the event of a compressor surge at low power settings, such as may occur following a bird strike, the TPU takes corrective control action to allow the engine to recover.

(2) The engine parameter used to detect compressor surge is high pressure compressor delivery pressure (P4). However, in order to establish a surge parameter independent of altitude, a computed value of rate of change of P4 divided by P4 is compared to a reference value.

(3) During normal engine operation, the computed value is greater than the reference value and the TPU system is not energized. If the computed value falls below the reference value, the TPU recognizes this as the onset of compressor surge.

(4) When the TPU detects a surge, it transmits corrective control signals to the BVCU, transient fuel valve (TFV) and to the ignition system.

(5) The control signals do these steps:

(a) A relay in the TPU disconnects the power lever angle signal to the BVCU, which automatically selects all bleed valves to the transient mode.

(b) After a delay of 0.5 seconds (to let the bleed valves fully open), the TPU energizes the TFV solenoid to reduce fuel flow to the burners (AMM 73-21-00/001)

(c) Continuous ignition is selected by the TPU.

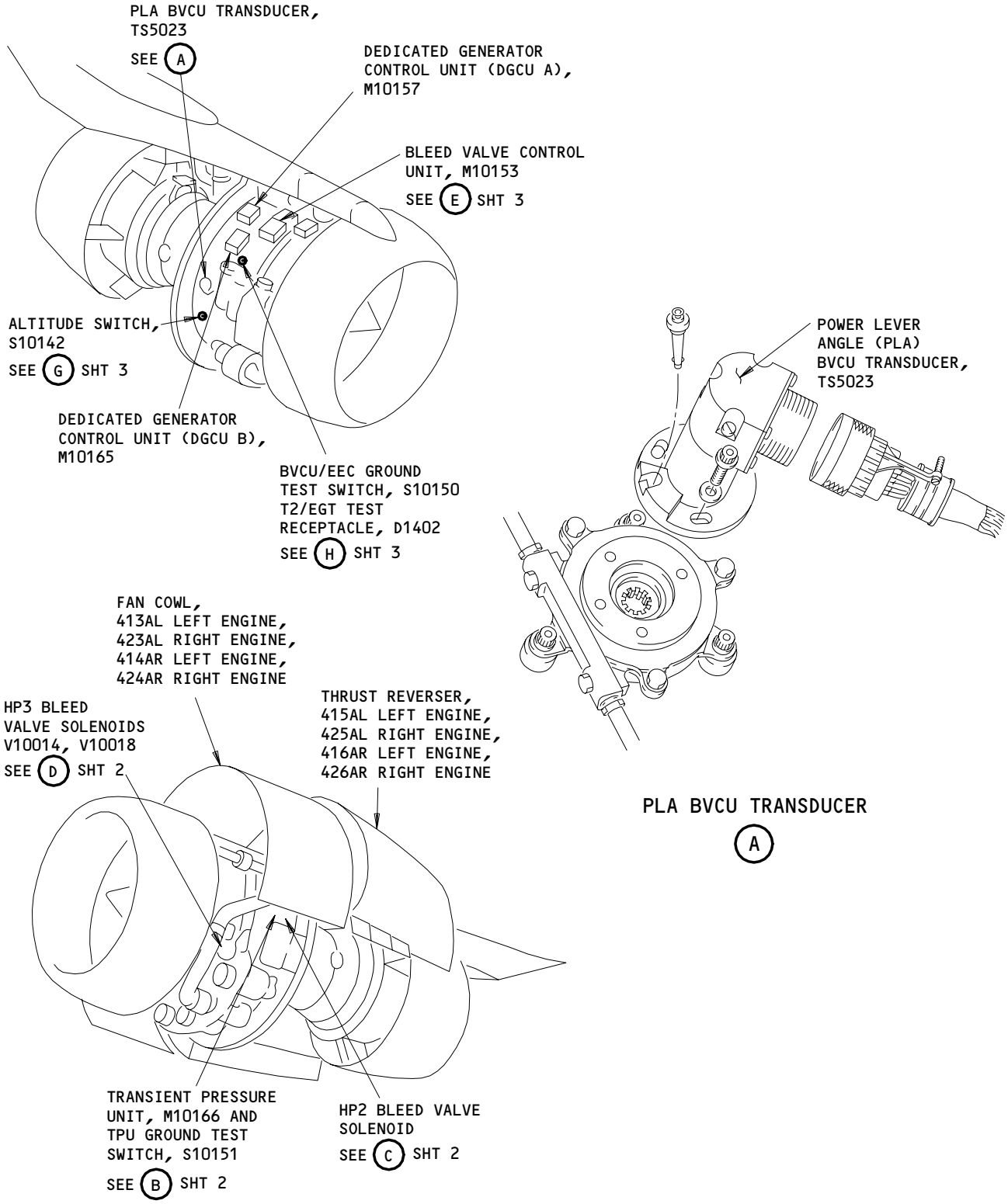
NOTE: Selection of the bleed valves to the transient schedule is latched for the remainder of the flight. Reset is automatically accomplished at next engine start.

Selection of fuel dip and continuous ignition is reset automatically after a timed period to allow for the possibility of multiple surges.

COMPRESSOR BLEED CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER -	--		FLIGHT COMPARTMENT, P11	
ENG HP BLD VLV-L/GND, C4113		1	11D21	
ENG HP BLD VLV-R/GND, C4114		1	11D22	
COMPUTER - (FIM 31-41-00/101)				
L EICAS, M10181				
R EICAS, M10182				
RECEPTACLE - T2/EGT TEST, D1402	3	1	414AR, L ENG R FAN COWL	
			424AR, R ENG R FAN COWL	
RELAY - (FIM 31-01-36/101)				
L ENG POWER, K10208				
RELAY - (FIM 31-01-37/101)				
R ENG POWER, K10220				
SOLENOID - NO. 1 HP3 BLD VLV, V10018	2	1	413AL, L ENG L FAN COWL	75-32-05
			423AL, R ENG L FAN COWL	75-32-05
SOLENOID - NO. 2 HP3 BLD VLV, V10014	2	1	413AL, L ENG L FAN COWL	75-32-05
			423AL, R ENG L FAN COWL	75-32-05
SOLENOID - NO. 1 IP BLD VLV, V10019	4	1	415AL, L ENG L THRUST REVERSER	75-32-03
			425AL, R ENG L THRUST REVERSER	75-32-03
SOLENOID - NO. 2 IP BLD VLV, V10020	4	1	416AR, L ENG R THRUST REVERSER	75-32-03
			426AR, L ENG R THRUST REVERSER	75-32-03
SOLENOID - HP2 BLD VLV	2	1	413AL, L ENG L FAN COWL	75-32-05
			423AL, R ENG L FAN COWL	75-32-05
SWITCH - ALTITUDE, S10142	3	1	414AR, L ENG R FAN COWL	75-32-07
			424AR, R ENG R FAN COWL	75-32-07
SWITCH - BVCU/EEC GND TEST, S10150	3	1	414AL, L ENG L FAN COWL	
			424AL, R ENG L FAN COWL	
SWITCH - TPU GND TEST, S10151	2	1	413AL, L ENG L FAN COWL	
			423AL, R ENG L FAN COWL	
THERMOCOUPLE - T2 SONIC, TS5024	4	1	BEHIND SPLITTER FAIRING	75-32-12
TRANSDUCER - POWER LEVER ANGLE (BVCU), TS5023	1	1	414AR, L ENG R FAN COWL	75-32-06
			424AR, R ENG R FAN COWL	75-32-06
TUBE - HP AND IP COMPRESSOR BLEED CONTROL AIR	2	4		75-32-09
UNIT - (FIM 73-21-10/101)				
DEDICATED GENERATOR CONTROL (DGCU A), M10157		1		
DEDICATED GENERATOR CONTROL (DGCU B), M10165		1		
UNIT - BLEED VALVE CONTROL, M10153	3	1	413AL, L ENG L FAN COWL	75-32-01
			423AL, R ENG L FAN COWL	75-32-01
UNIT - TRANSIENT PRESSURE, M10166	2	1	413AL, L ENG L FAN COWL	75-32-05
			423AL, R ENG L FAN COWL	75-32-05
VALVE - HP COMPRESSOR BLEED	5	3	415AL,425AL,416AR,426AR, THRUST REVERSER	75-32-04
VALVE - IP COMPRESSOR BLEED	5	3	415AL,425AL,416AR,426AR, THRUST REVERSER	75-32-02

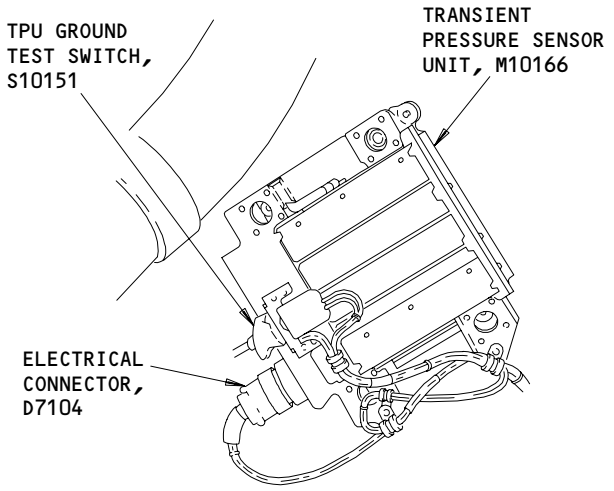
Compressor Bleed Control System - Component Index
Figure 101



Compressor Bleed Control System - Component Location
Figure 102 (Sheet 1)

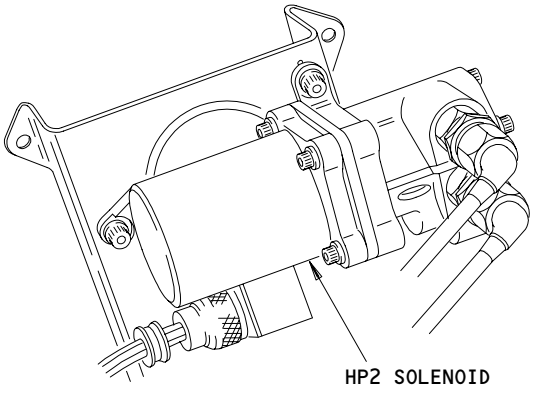
EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-9 AND POST-SB 757-75-5

E42501



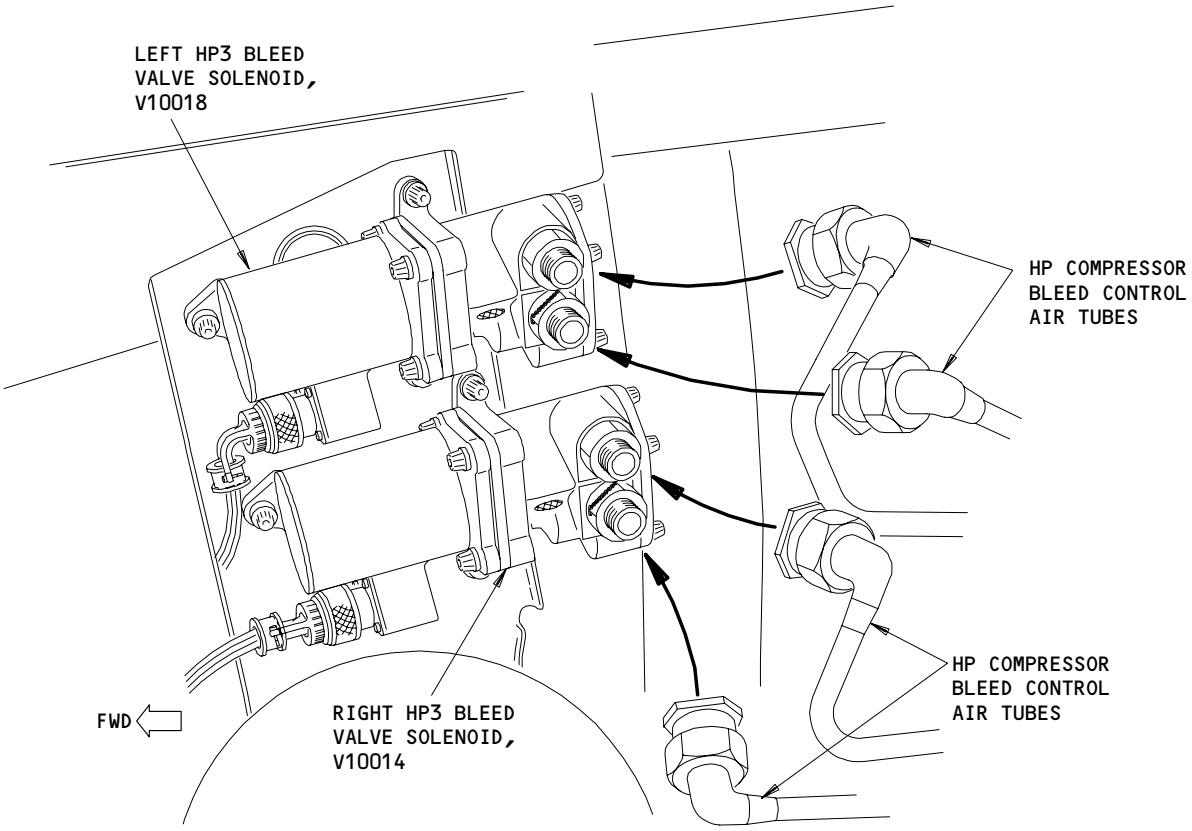
TRANSIENT PRESSURE UNIT (TPU)

B



HP2 SOLENOID

C

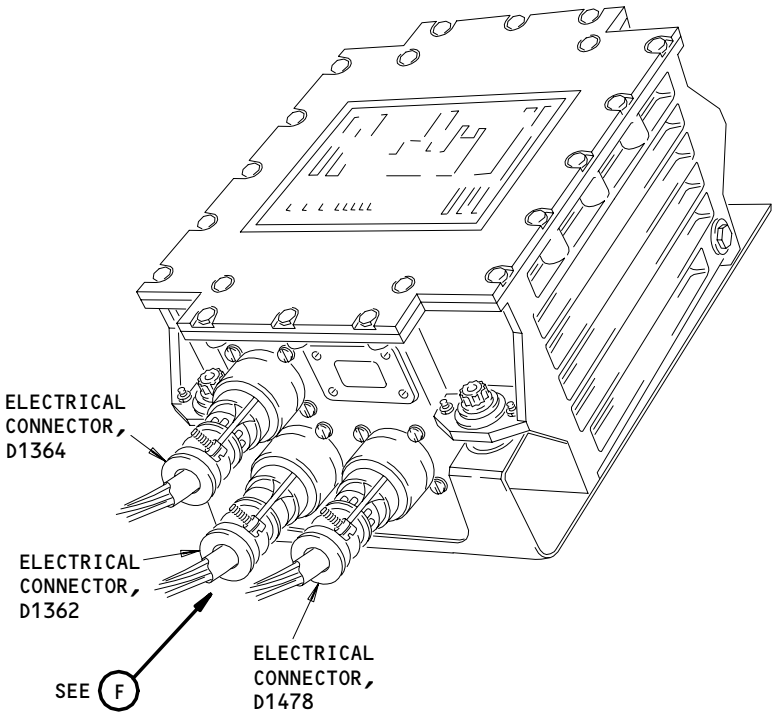


HP3 BLEED VALVE SOLENOID

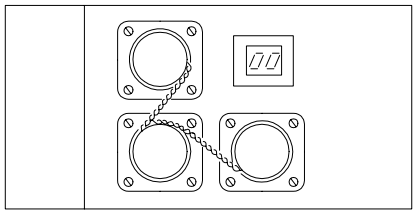
D

59997

Compressor Bleed Control System – Component Location (Details from Sht 1)
Figure 102 (Sheet 2)



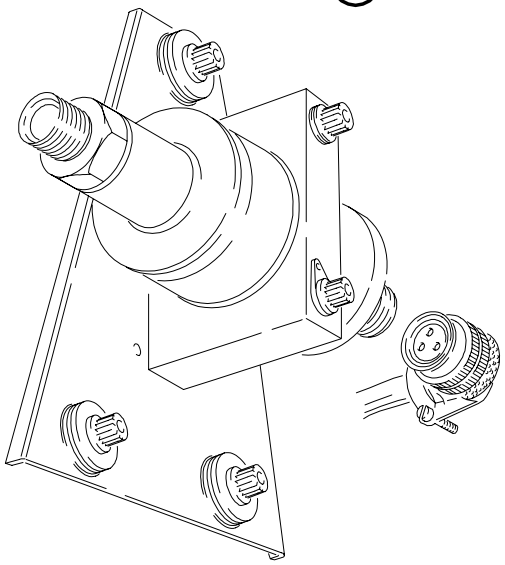
BLEED VALVE CONTROL UNIT (BVCU), M10153



LOCKWIRE ARRANGEMENT

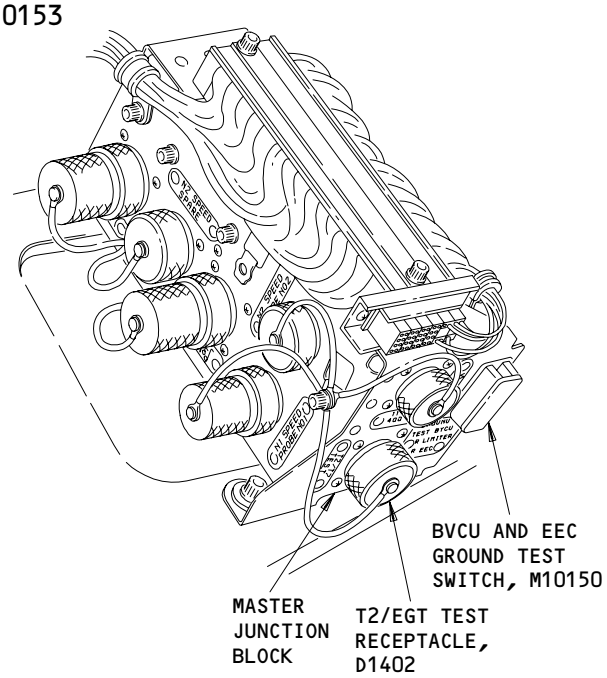
F

E FROM SHT 1



ALTITUDE SWITCH, S10142

G FROM SHT 1



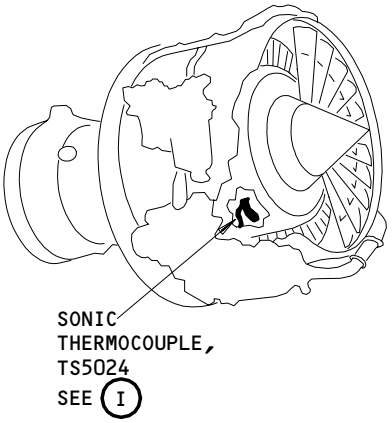
MASTER JUNCTION BLOCK

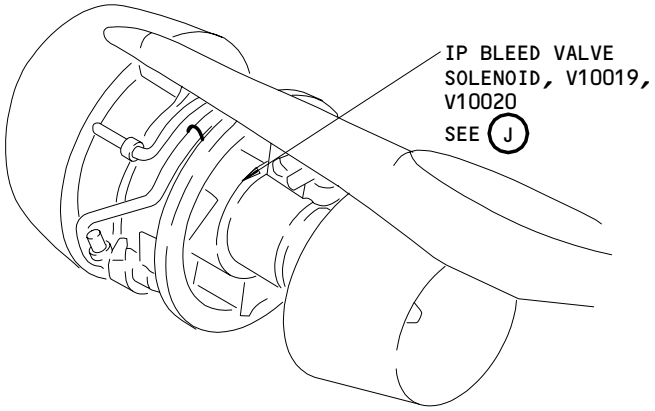
H FROM SHT 1

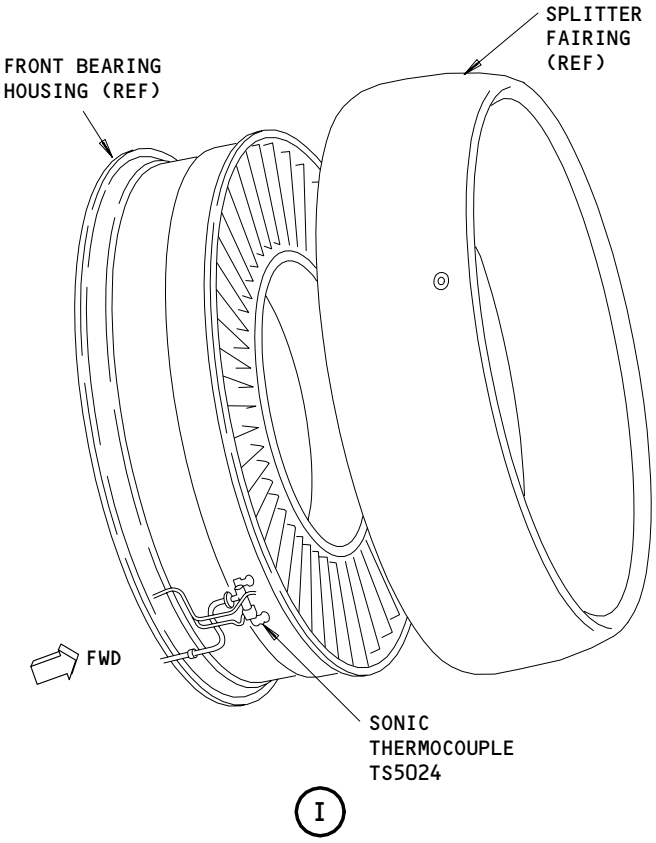
Compressor Bleed Control System – Component Location
Figure 102 (Sheet 3)

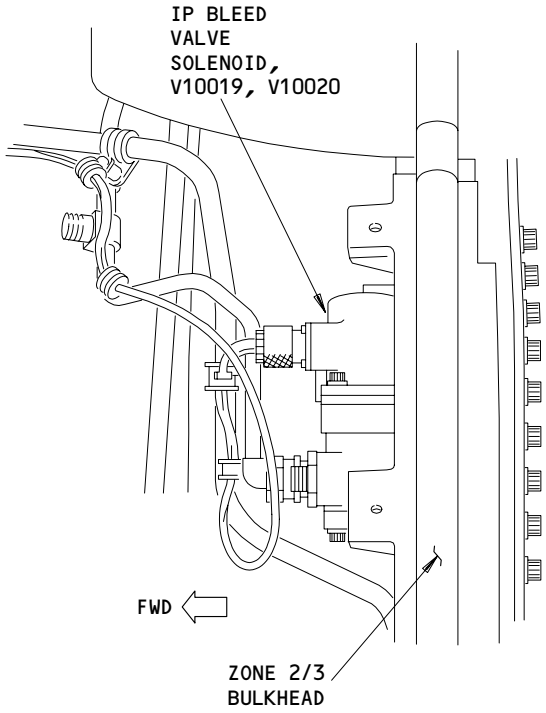
EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-9 AND POST-SB 757-75-5

E42533







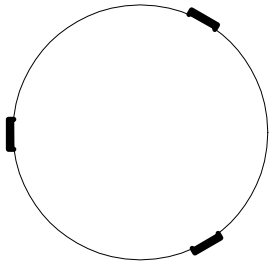


60011

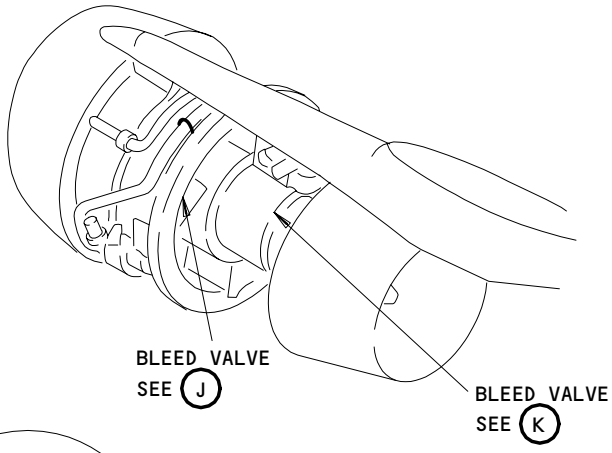
Compressor Bleed Control System – Component Location
Figure 102 (Sheet 4)

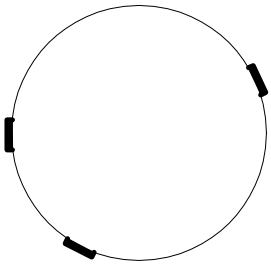
EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-9
AND POST-SB 757-75-5

E42537

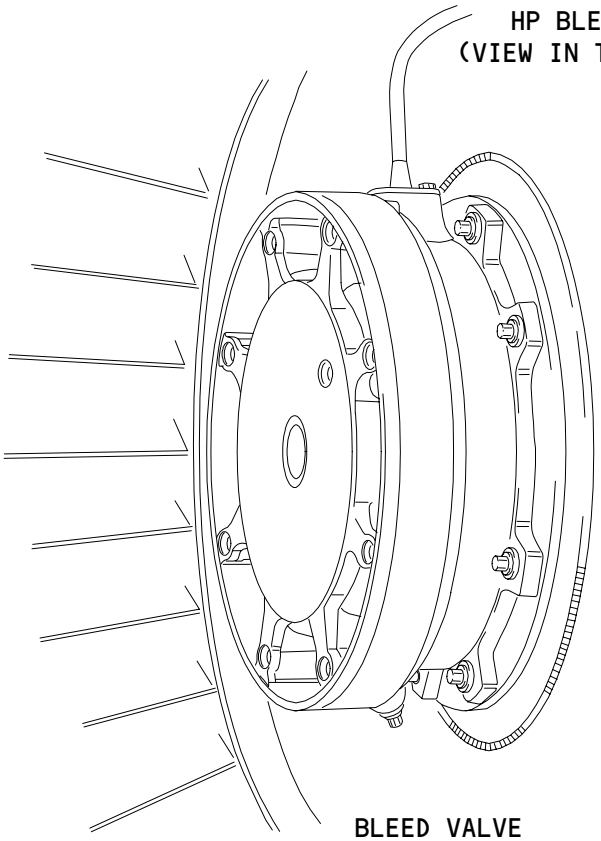


IP BLEED VALVE LOCATIONS
(VIEW IN THE FORWARD DIRECTION)

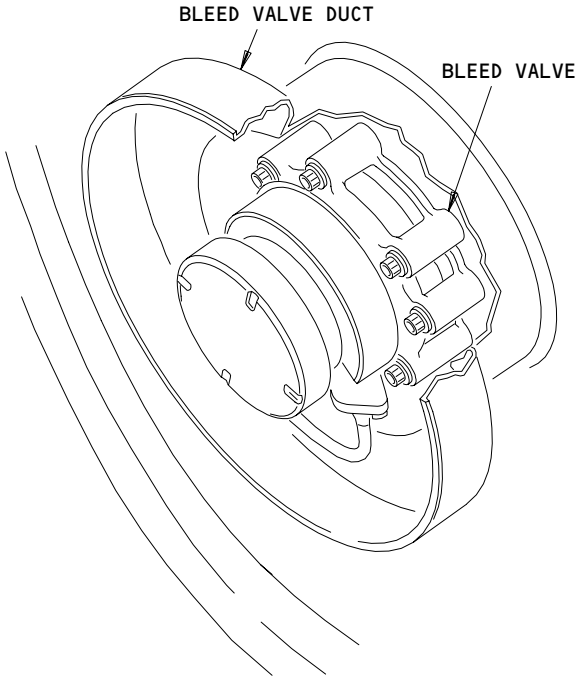




HP BLEED VALVE LOCATIONS
(VIEW IN THE FORWARD DIRECTION)



BLEED VALVE
J



BLEED VALVE
K

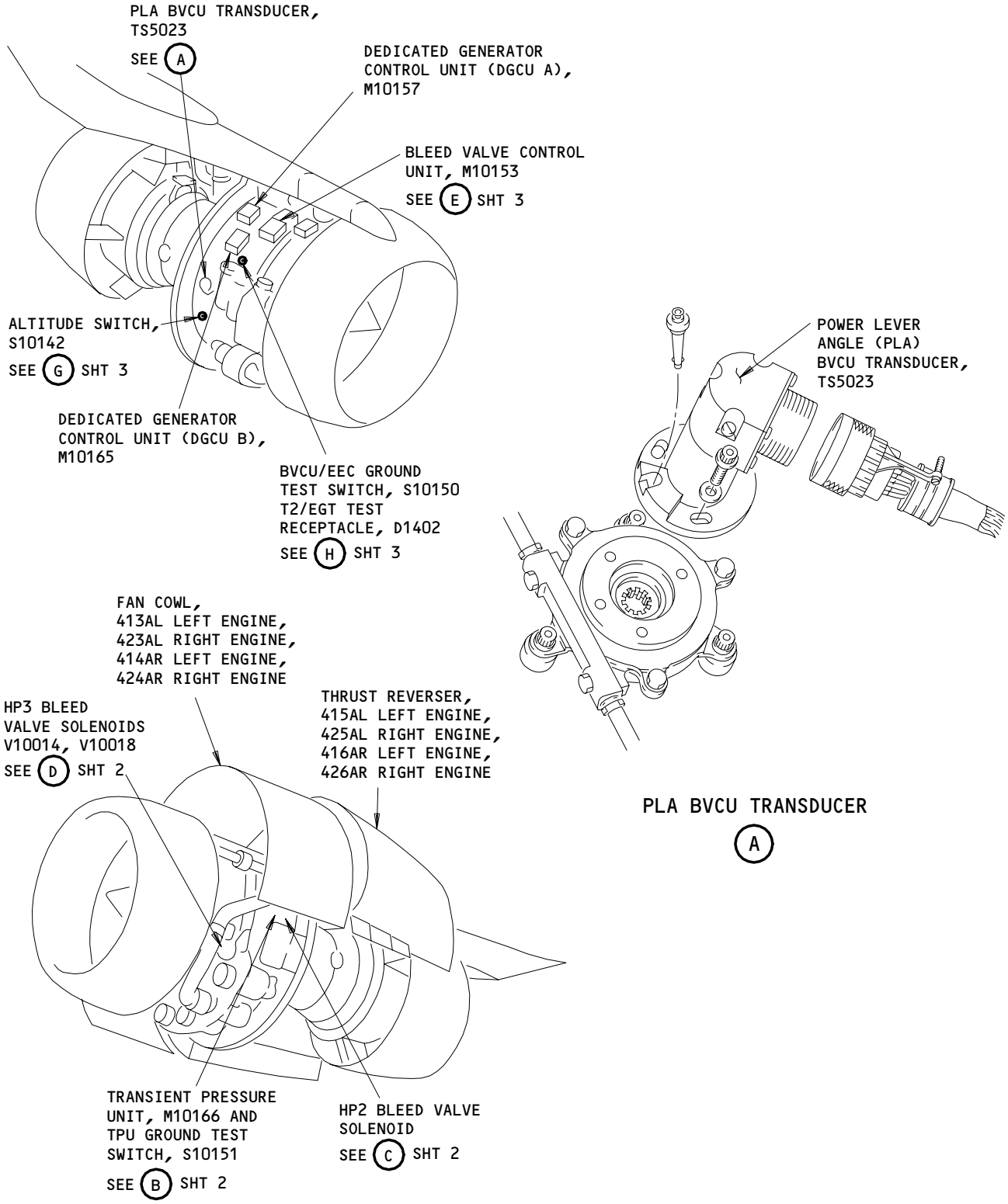
Compressor Bleed Control System - Component Location
Figure 102 (Sheet 5)

COMPRESSOR BLEED CONTROL SYSTEM

COMPONENT	FIG. 102 SHT	QTY	ACCESS/AREA	AMM REFERENCE
CIRCUIT BREAKER -	--		FLIGHT COMPARTMENT, P11	
ENG HP BLD VLV-L/GND, C4113		1	11D21	
ENG HP BLD VLV-R/GND, C4114		1	11D22	
COMPUTER - (FIM 31-41-00/101)				
L EICAS, M10181				
R EICAS, M10182				
RECEPTACLE - T2/EGT TEST, D1402	3	1	414AR, L ENG R FAN COWL	
			424AR, R ENG R FAN COWL	
RELAY - (FIM 31-01-36/101)				
L ENG POWER, K10208				
RELAY - (FIM 31-01-37/101)				
R ENG POWER, K10220				
SOLENOID - HP2 BLD VLV	2	1	413AL, L ENG L FAN COWL	75-32-05
			423AL, R ENG L FAN COWL	75-32-05
SOLENOID - NO. 1 HP3 BLD VLV, V10018	2	1	413AL, L ENG L FAN COWL	75-32-05
			423AL, R ENG L FAN COWL	75-32-05
SOLENOID - NO. 1 IP BLD VLV, V10019	4	1	415AL, L ENG L THRUST REVERSER	75-32-03
			425AL, R ENG L THRUST REVERSER	75-32-03
SOLENOID - NO. 2 HP3 BLD VLV, V10014	2	1	413AL, L ENG L FAN COWL	75-32-05
			423AL, R ENG L FAN COWL	75-32-05
SOLENOID - NO. 2 IP BLD VLV, V10020	4	1	416AR, L ENG R THRUST REVERSER	75-32-03
			426AR, L ENG R THRUST REVERSER	75-32-03
SWITCH - ALTITUDE, S10142	3	1	414AR, L ENG R FAN COWL	75-32-07
			424AR, R ENG R FAN COWL	75-32-07
SWITCH - BVCU/EEC GND TEST, S10150	3	1	414AL, L ENG L FAN COWL	
			424AL, R ENG L FAN COWL	
SWITCH - TPU GND TEST, S10151	2	1	413AL, L ENG L FAN COWL	
			423AL, R ENG L FAN COWL	
THERMOCOUPLE - T2 SONIC, TS5024	4	1	BEHIND SPLITTER FAIRING	75-32-12
TRANSDUCER - POWER LEVER ANGLE (BVCU), TS5023	1	1	414AR, L ENG R FAN COWL	75-32-06
			424AR, R ENG R FAN COWL	75-32-06
TUBE - HP AND IP COMPRESSOR BLEED CONTROL AIR	2	4		75-32-09
UNIT - (FIM 73-21-10/101)				
DEDICATED GENERATOR CONTROL (DGCU A), M10157		1		
DEDICATED GENERATOR CONTROL (DGCU B), M10165		1		
UNIT - BLEED VALVE CONTROL, M10153	3	1	413AL, L ENG L FAN COWL	75-32-01
			423AL, R ENG L FAN COWL	75-32-01
UNIT - TRANSIENT PRESSURE, M10166	2	1	413AL, L ENG L FAN COWL	75-32-05
			423AL, R ENG L FAN COWL	75-32-05
VALVE - HP COMPRESSOR BLEED	5	3	415AL,425AL,416AR,426AR, THRUST REVERSER	75-32-04
VALVE - IP COMPRESSOR BLEED	5	3	415AL,425AL,416AR,426AR, THRUST REVERSER	75-32-02

Compressor Bleed Control System - Component Index
Figure 101

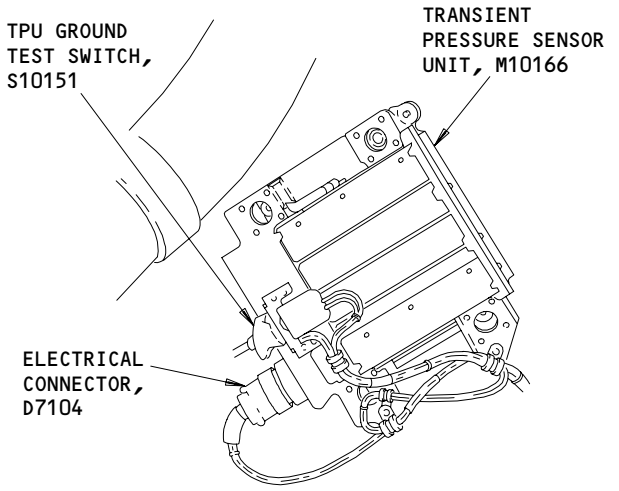
F21716



Compressor Bleed Control System - Component Location
Figure 102 (Sheet 1)

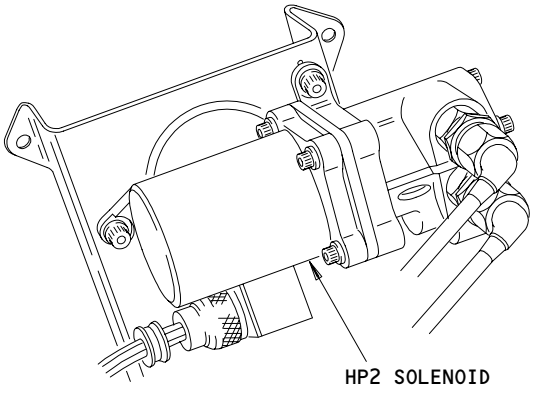
EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-11, C8E38-12 OR C8E38-15

F27742



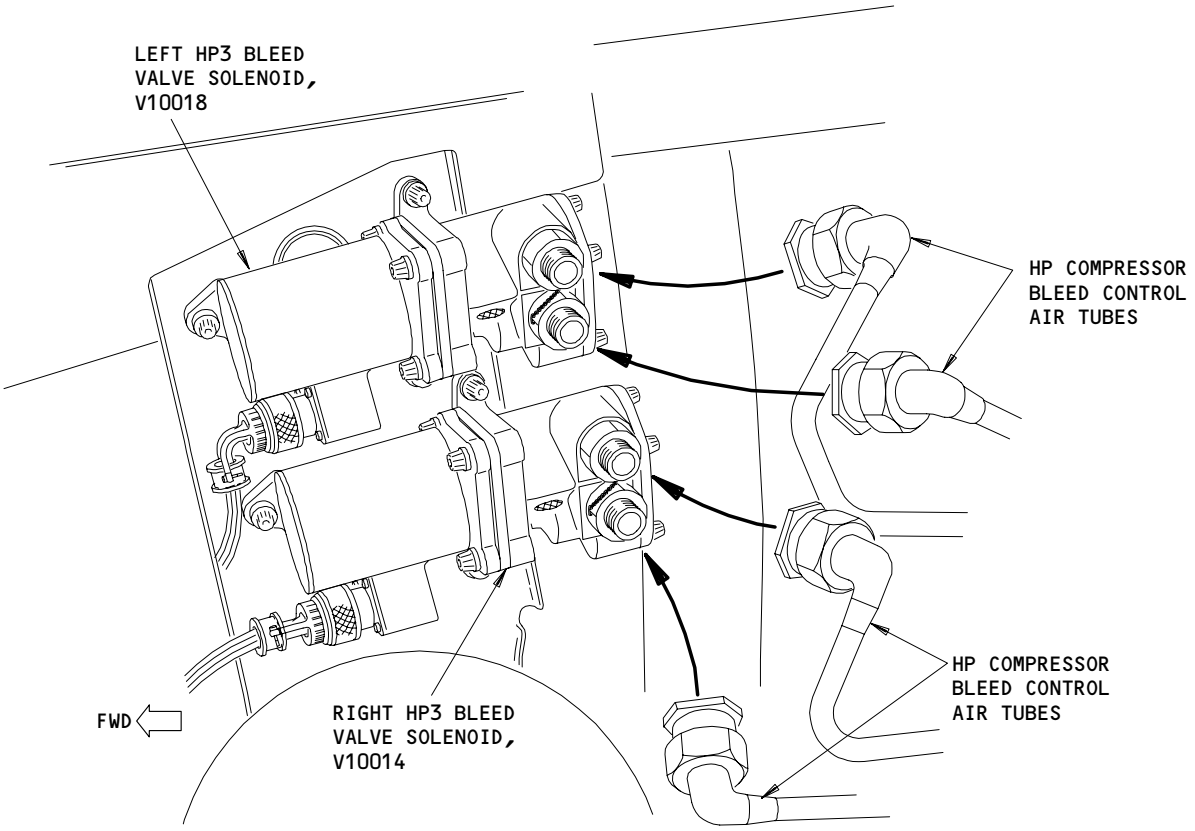
TRANSIENT PRESSURE UNIT (TPU)

B



HP2 SOLENOID

C

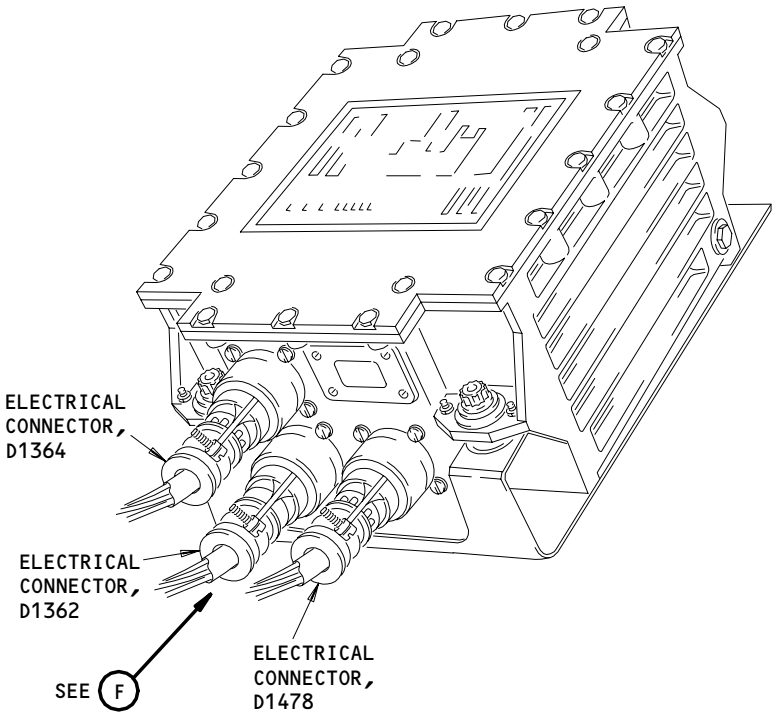


HP3 BLEED VALVE SOLENOID

D

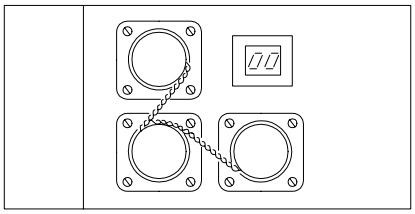
59997

Compressor Bleed Control System – Component Location (Details from Sht 1)
Figure 102 (Sheet 2)



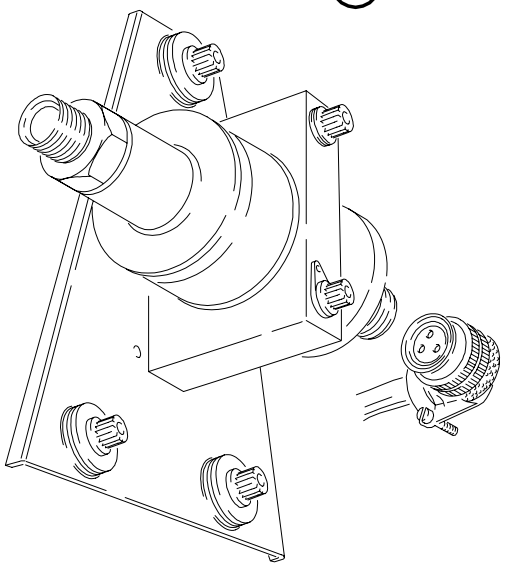
BLEED VALVE CONTROL UNIT (BVCU), M10153

(E) FROM SHT 1



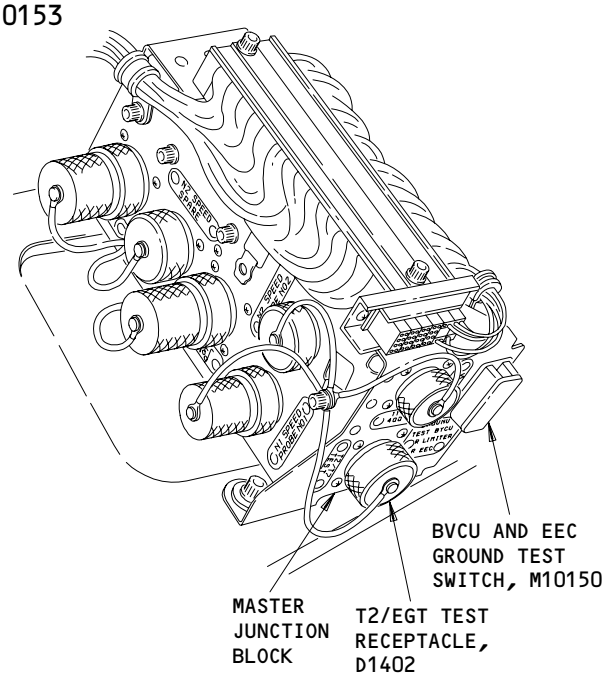
LOCKWIRE ARRANGEMENT

(F)



ALTITUDE SWITCH, S10142

(G) FROM SHT 1



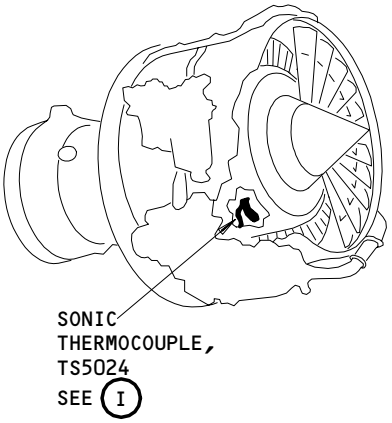
MASTER JUNCTION BLOCK

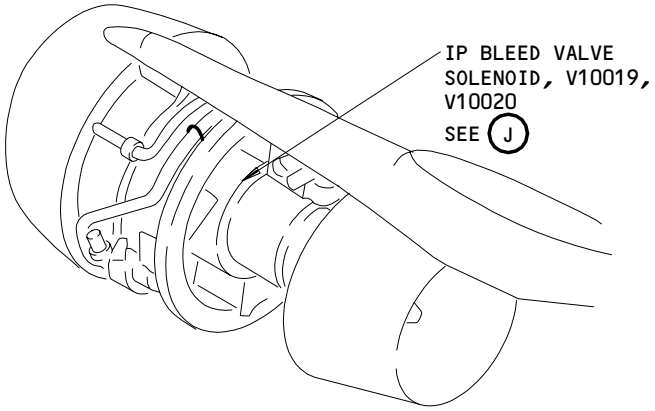
(H) FROM SHT 1

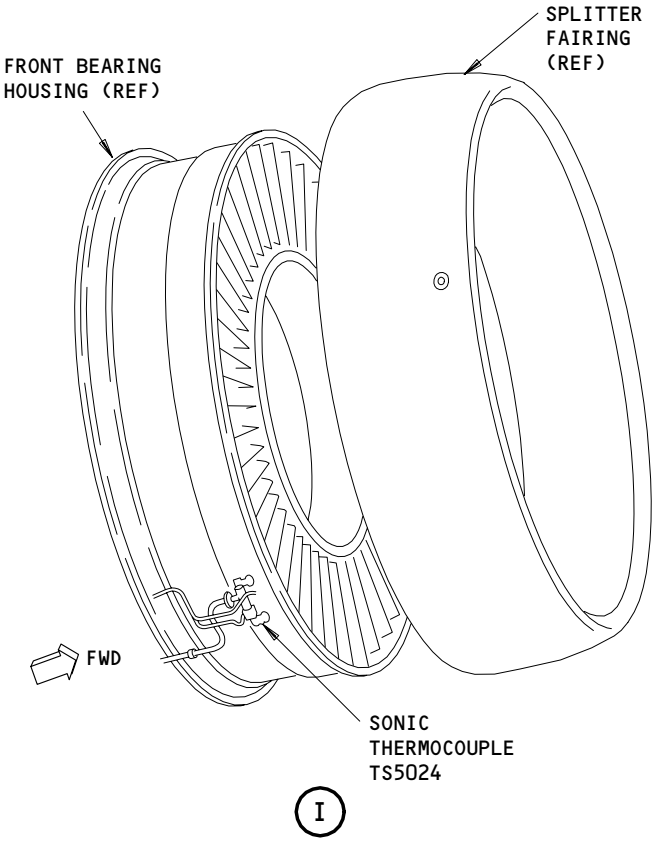
Compressor Bleed Control System – Component Location
Figure 102 (Sheet 3)

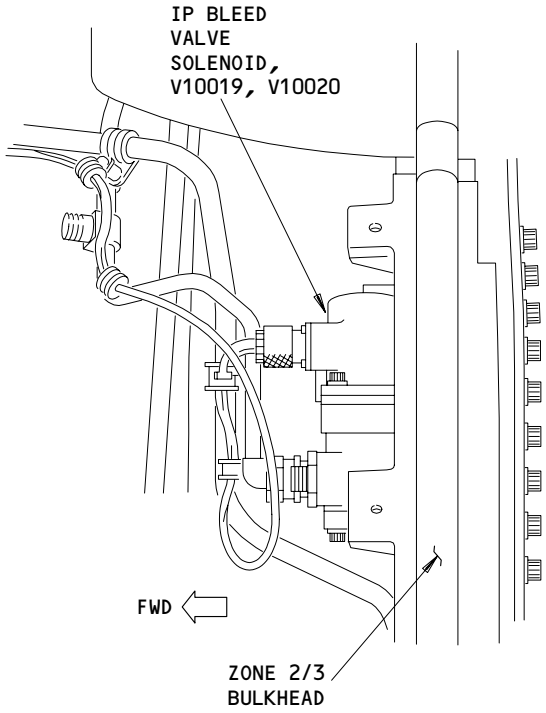
EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-11, C8E38-12 OR C8E38-15

F27747







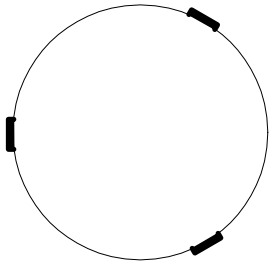


60011

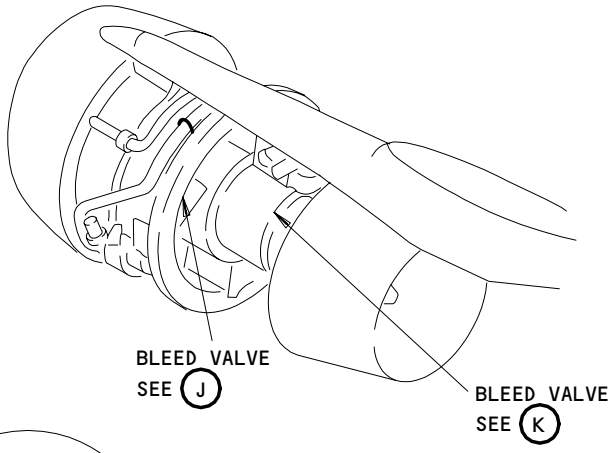
Compressor Bleed Control System - Component Location
Figure 102 (Sheet 4)

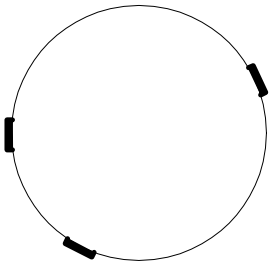
EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-11,
C8E38-12 OR C8E38-15

F27750

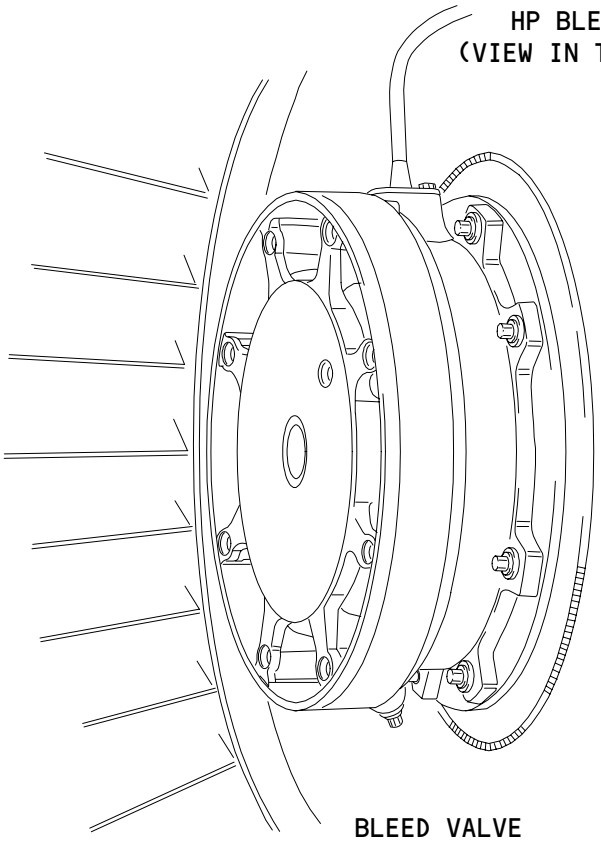


IP BLEED VALVE LOCATIONS
(VIEW IN THE FORWARD DIRECTION)

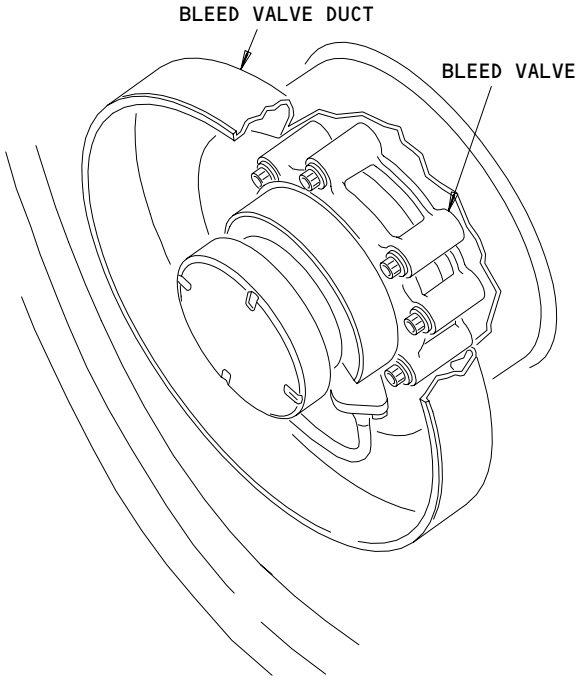




HP BLEED VALVE LOCATIONS
(VIEW IN THE FORWARD DIRECTION)



BLEED VALVE
J



BLEED VALVE
K

Compressor Bleed Control System - Component Location
Figure 102 (Sheet 5)

EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-11,
C8E38-12 OR C8E38-15

F27752

COMPRESSOR BLEED CONTROL SYSTEM - MAINTENANCE PRACTICES

1. General
   A. This procedure contains steps to interrogate and understand the information received from the bleed valve control unit (BVCU) Built In Test Equipment (BITE) and the transient pressure unit (TPU) BITE procedures.

   TASK 75-32-00-702-001-R03

2. Interrogation of the BVCU
   A. General
      (1) To do on-wing maintenance without additional test equipment, the BVCU includes Built In Test Equipment (BITE).

      (2) BVCU Fault Monitoring
         (a) On each engine start, the fault monitoring system completes a self-test to make sure there are no bleed valve control system and BVCU dormant failures.
         (b) Continuous monitoring of the bleed valve control system and BVCU is done when the engine is in operation and power is supplied by the dedicated generator.
            1) Only faults found during continuous monitoring are stored in the BVCU memory.
         (c) During engine start and continuous monitoring, faults found are shown on the EICAS display pages (AMM 31-41-00).
            1) ON AIRPLANES WITHOUT SB 757-75-5;
               A bleed valve control system fault that causes the message L or R ENG SURGE CONT to be shown on the EICAS display STATUS and MAINTENANCE pages is dispatch critical and must be corrected before the subsequent flight.
            2) ON AIRPLANES WITH SB 75-5;
               the L and R ENG SURGE CONT EICAS message is removed.

               NOTE: The EICAS message column for the BVCU External Fault Codes 02, 03, 05, 06, 07, 10 and 11, 12 and 13, 91, 92, and BB (Fig. 203) changed from L or R ENG SURGE CONT - STATUS to L or R ENG SURGE BITE - MAINTENANCE.

3) The fault also causes the message L or R ENG SURGE BITE to be shown on the EICAS maintenance page.
a) A bleed valve control system fault that causes the message L or R ENG SURGE BITE to be shown on the EICAS display MAINTENANCE page is not dispatch critical.

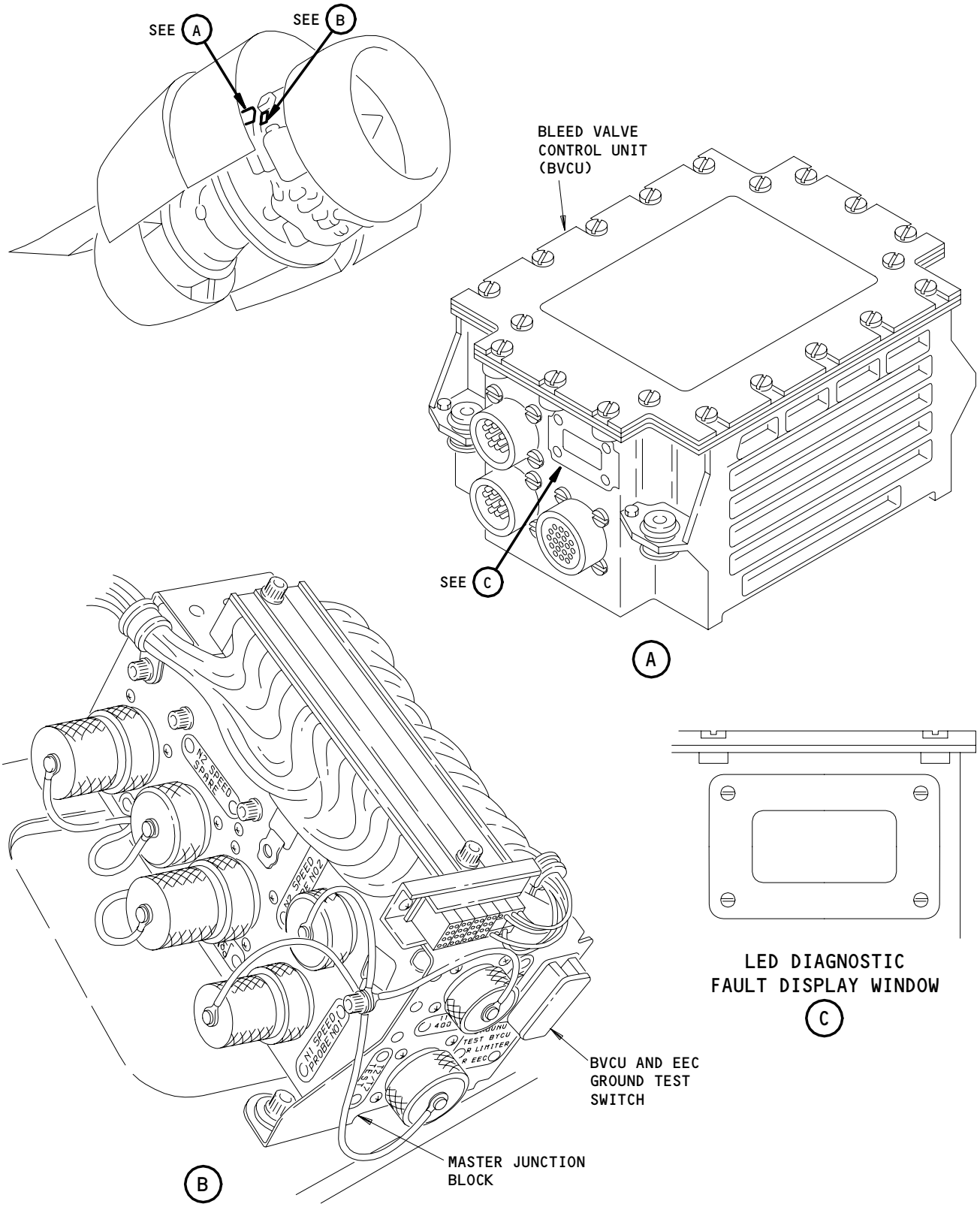
(d) Power for a ground test is supplied to the BVCU through the ground test switch (found on the master junction block).
1) A self-test equivalent to the engine start self-test is done.
2) Faults found during the self-test and from flights before are shown as fault codes on the LED fault display window (Fig. 201).

(3) Fault Code Sequence
(a) When you use the ground test routine, faults stored in the BVCU memory are each identified by a fault code shown in the LED fault display window (Fig. 201).
1) BVCU interrogation is done in a fault code sequence (Fig. 202).
2) The fault code sequence is shown three times (codes CC and ED are shown only one time).
(b) Fault codes available for the interrogation of the BVCU are shown in the BVCU Internal and External Fault Code Tables (Fig. 203).
1) ON AIRPLANES WITH SB 75-5;
The EICAS message column for the BVCU External Fault Codes 02, 03, 05, 06, 07, 10 and 11, 12 and 13, 91, 92, and BB (Fig. 203) changed from L or R ENG SURGE CONT - STATUS to L or R ENG SURGE BITE - MAINTENANCE.

B. Procedure

S 742-002-R03
(1) Fault Code Display
(a) The examples that follow are fault codes shown during seven flights in example 1 and eight flights in example 2.
(b) Example 1
1) Flight numbers and their fault status:

Flight No. 1 - Fault free
Flight No. 2 - Fault free
Flight No. 3 - Faults: 01, BB displayed
Flight No. 4 - Fault free
Flight No. 5 - Faults: 01, BB displayed
Flight No. 6 - Faults: 01, BB displayed
Flight No. 7 - Fault Free



BVCU Interrogation
Figure 201

DISPLAY	FUNCTION	DISPLAY TIME
CC	Self-test in progress	30 seconds
AA	Flashing four times - indicates memory code sequence about to commence	
XX	Displays each fault found during self-test - XX being a discrete code for each fault. If no fault found, this display is omitted	4 seconds each fault
F(N)	Where N equals the number of fault free flights since the last fault producing flight	4 seconds
XX	Displays each fault found during the last fault producing flight	4 seconds each fault
F(N)	Where N equals the number of fault free flights between the last two fault producing flights	4 seconds
XX	Displays each fault found during the second to last fault producing flight	4 seconds each fault
F(N)	Where N equals the number of fault free flights between the second to last and third to last fault producing flights	4 seconds
XX	Displays each fault found during the third to last fault producing flight	4 seconds each fault
ED	End of display	10 seconds

NOTE: After more than nine fault free flights, the F(N) display is replaced by FA.

BVCU Fault Code Sequence
Figure 202

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
01	L OR R ENG SURGE BITE – MAINTENANCE	OPEN CIRCUIT IN THE ALTITUDE SWITCH CIRCUIT.	BLEED VALVES OPERATE IN HIGH ALTITUDE MODE, I.E. HIGHER LEVEL OF N2/√T2.
02	L OR R ENG SURGE BITE – MAINTENANCE	N2 NO. 1 SPEED PROBE FAULT	1. PLA WILL OVERRIDE N2/√T2 SCHEDULE AND CONTROL BLEED VALVE OPENING AND CLOSING. 2. DDU CHANNEL 1 INOPERATIVE.
03	L OR R ENG SURGE BITE – MAINTENANCE	N2 NO. 2 SPEED PROBE FAULT	DDU CHANNEL 2 INOPERATIVE.
04	L OR R ENG SURGE BITE – MAINTENANCE	PLA FAULT. OPEN CIRCUIT INPUT OR OUTPUT COIL ON PLA TRANSDUCER OR OPEN CIRCUIT WIRING PLA/BVCU/TPU OR TPU "TRIPPED".	BLEED VALVES WILL OPERATE IN TRANSIENT MODE, I.E. AT HIGHER LEVEL OF N2/√T2.
05	L OR R ENG SURGE BITE – MAINTENANCE	T2 THERMOCOUPLE SIGNAL FAULT.	PLA WILL OVERRIDE N2/√T2 SCHEDULE AND CONTROL THE BLEED VALVE OPENING AND CLOSING.
06	L OR R ENG SURGE BITE – MAINTENANCE	DGCU A FAULT OR OPEN CIRCUIT DISCRETE SIGNAL WIRE FROM DGCU "A" TO BVCU	NO EFFECT, UNLESS DGCU "B" ALSO FAULTY
07	L OR R ENG SURGE BITE – MAINTENANCE	DGCU B FAULT OR OPEN CIRCUIT DISCRETE SIGNAL WIRE FORM DGCU "B" TO BVCU	NO EFFECT, UNLESS DGCU "A" ALSO FAULTY
10	L OR R ENG SURGE BITE – MAINTENANCE	HP 3.2 SOLENOID. OPEN CIRCUIT ON COIL A OR B, OF THE TWO COILS A AND B.	NO EFFECT UNLESS THE TWO COILS A AND B OPEN CIRCUITS, WHICH RESULTS IN THE HP 3.2 BLEED VALVE TO FAIL CLOSED.

BVCU External Fault Codes
Figure 203 (Sheet 1)

FAULT CODE	MESSAGE EICAS	FAULT DESCRIPTION	EFFECT ON SYSTEM
11	L OR R ENG SURGE BITE – MAINTENANCE	HP 3.1 SOLENOID. OPEN CIRCUIT ON COIL A OR B, OR THE TWO COILS A AND B.	NO EFFECT UNLESS THE TWO COILS A AND B OPEN CIRCUIT, WHICH RESULTS IN THE HP 3.1 BLEED VALVE TO FAIL OPEN.
12	L OR R ENG SURGE BITE – MAINTENANCE	IP STAGE 1 BLEED VALVE SOLENOID OPEN CIRCUIT ON COIL A OR B, OR THE TWO COILS A AND B.	NO EFFECT UNLESS THE TWO COILS OPEN CIRCUIT. IF THE TWO COILS OPEN CIRCUIT, IP STAGE 1 BLEED VALVES FAIL OPEN.
13	L OR R ENG SURGE BITE – MAINTENANCE	IP STAGE 2 BLEED VALVE SOLENOID OPEN CIRCUIT ON COIL A OR B, OR THE TWO COILS A AND B.	NO EFFECT UNLESS THE TWO COILS OPEN CIRCUIT. IF THE TWO COILS OPEN CIRCUIT, IP STAGE 2 BLEED VALVE FAILS OPEN.
16	L OR R ENG SURGE BITE – MAINTENANCE	PLA TRANSDUCER INCORRECTLY SET.	INCORRECT SCHEDULING ON PLA OVERRIDE.
18	L OR R ENG SURGE BITE – MAINTENANCE	HP2 A SOLENOID OPEN CIRCUIT.	NO EFFECT.
19	L OR R ENG SURGE BITE – MAINTENANCE	HP2 B SOLENOID OPEN CIRCUIT.	NO EFFECT.
91	L OR R ENG SURGE BITE – MAINTENANCE	DDU CHANNEL 1 FAULT. CHANNEL INOPERATIVE.	IN THE EVENT OF SURGE, ONLY HP 3.2 BLEED VALVE WILL OPEN.
92	L OR R ENG SURGE BITE – MAINTENANCE	DDU CHANNEL 2 FAULT. CHANNEL INOPERATIVE.	IN THE EVENT OF SURGE, ONLY HP 3.1 BLEED VALVE WILL OPEN.
BB	L OR R ENG SURGE BITE – MAINTENANCE	BVCU INTERNAL FAULT	

BVCU External Fault Codes
Figure 203 (Sheet 2)

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
01	L CR R ENG SURGE BITE – MAINTENANCE	OPEN CIRCUIT IN THE ALTITUDE SWITCH CIRCUIT.	BLEED VALVES OPERATE IN HIGH ALTITUDE MODE, I.E. HIGHER LEVEL OF N2/√T2.
02	L OR R ENG SURGE CONT – STATUS	N2 NO. 1 SPEED PROBE OPEN CIRCUIT.	1. PLA WILL OVERRIDE N2/√T2 SCHEDULE AND CONTROL BLEED VALVE OPENING AND CLOSING. 2. DDU CHANNEL 1 INOPERATIVE.
03	L OR R ENG SURGE CONT – STATUS	N2 NO. 2 SPEED PROBE OPEN CIRCUIT.	DDU CHANNEL 2 INOPERATIVE.
04	L OR R ENG SURGE BITE – MAINTENANCE	PLA FAULT. OPEN CIRCUIT INPUT OR OUTPUT COIL ON PLA TRANSDUCER OR OPEN CIRCUIT WIRING PLA/BVCU/TPU OR TPU "TRIPPED".	BLEED VALVES WILL OPERATE IN TRANSIENT MODE, I.E. AT HIGHER LEVEL OF N2/√T2.
05	L OR R ENG SURGE CONT – STATUS	T2 THERMOCOUPLE SIGNAL FAULT.	PLA WILL OVERRIDE N2/√T2 SCHEDULE AND CONTROL BLEED VALVE OPENING AND CLOSING.
06	L OR R ENG SURGE BITE – MAINTENANCE	DGCU A FAULT.	NO EFFECT.
06	L OR R ENG SURGE CONT – STATUS	DEDICATED GEN/DGCU A AND B FAULT AT LOW POWER.	LEFT–HAND HP3 BLEED VALVE OPEN. RIGHT–HAND HP3 AND HP2 BLEED VALVE CLOSED. IP BLEED VALVES OPEN.
06	L OR R ENG SURGE CONT – STATUS	DEDICATED GEN/DGCU A AND B FALUT AT HIGH POWER.	HP BLEED VALVES CLOSED. IP BLEED VALVES OPEN.
07	L OR R ENG SURGE BITE – MAINTENANCE	DGCU B FAULT.	NO EFFECT.
07	L OR R ENG SURGE CONT – STATUS	DEDICATED GEN/DGCU A AND B FAULT AT LOW POWER.	LEFT–HAND HP3 BLEED VALVE OPEN. RIGHT–HAND HP3 AND HP2 BLEED VALVE CLOSED. IP BLEED VALVES OPEN.
07	L OR R ENG SURGE CONT – STATUS	DEDICATED GEN/DGCU A AND B FAULT AT HIGH POWER.	HP BLEED VALVES CLOSED. IP BLEED VALVES OPEN.
10	L OR R ENG SURGE BITE – MAINTENANCE	HP 3.2 SOLENOID. OPEN CIRCUIT ON COIL A OR B, OF BOTH A AND B.	NO EFFECT UNLESS BOTH COILS A AND B OPEN CIRCUITS, WHICH RESULTS IN THE HP 3.2 BLEED VALVE TO FAIL CLOSED.
10 AND 11	L OR R ENG SURGE CONT – STATUS	HP 3.1 SOLENOID.	SEE EFFECT ON SYSTEM COMMENTS FOR FAULT CODE 10 AND FAULT CODE 11.

BVCU External Fault Codes
Figure 203 (Sheet 3)

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
11	L OR R ENG SURGE BITE – MAINTENANCE	HP 3.1 SOLENOID. OPEN CIRCUIT ON COIL A OR B, OR BOTH A AND B.	NO EFFECT UNLESS BOTH COILS A AND B OPEN CIRCUIT, WHICH RESULTS IN THE HP 3.1 BLEED VALVE TO FAIL OPEN.
12	L OR R ENG SURGE BITE – MAINTENANCE	IP STAGE 1 BLEED VALVE SOLENOID OPEN CIRCUIT ON COIL A OR B, OR BOTH A AND B.	NO EFFECT UNLESS BOTH COILS OPEN CIRCUIT. IF BOTH COILS OPEN CIRCUIT, IP STAGE 1 BLEED VALVES FAIL OPEN.
12 AND 13	L OR R ENG SURGE CONT – STATUS	IF STAGE 1 BLEED VALVE SOLENOID OPEN CIRCUIT ON COIL A OR B, OR BOTH A AND B. IF STAGE 2 BLEED VALVE SOLENOID OPEN CIRCUIT ON COIL A OR B, OR BOTH A AND B.	SEE EFFECT ON SYSTEM COMMENTS FOR FAULT CODE 12 AND FAULT CODE 13.
13	L OR R ENG SURGE BITE – MAINTENANCE	IP STAGE 2 BLEED VALVE SOLENOID OPEN CIRCUIT ON COIL A OR B, OR BOTH A AND B.	NO EFFECT UNLESS BOTH COILS OPEN CIRCUIT. IF BOTH COILS OPEN CIRCUIT, IP STAGE 2 BLEED VALVE FAILS OPEN.
16	L OR R ENG SURGE BITE – MAINTENANCE	PLA TRANSDUCER INCORRECTLY SET.	INCORRECT SCHEDULING ON PLA OVERRIDE.
18	L OR R ENG SURGE BITE – MAINTENANCE	HP2 A SOLENOID OPEN CIRCUIT.	NO EFFECT.
18 AND 19	L OR R ENG SURGE CONT – STATUS	HP2 SOLENOID COILS A AND B OPEN CIRCUIT.	HP2 BLEED VALVE FAILS CLOSED.
19	L OR R ENG SURGE BITE – MAINTENANCE	HP2 B SOLENOID OPEN CIRCUIT.	NO EFFECT.
91	L OR R ENG SURGE CONT – STATUS	DDU CHANNEL 1 FAULT. CHANNEL INOPERATIVE.	IN EVENT OF SURGE ONLY HP 3.2 BLEED VALVE WILL OPEN.
92	L OR R ENG SURGE CONT – STATUS	DDU CHANNEL 2 FAULT. CHANNEL INOPERATIVE.	IN EVENT OF SURGE ONLY HP 3.1 BLEED VALVE WILL OPEN.
BB	L OR R ENG SURGE CONT – STATUS OR L OR R ENG SURGE BITE – MAINTENANCE	BVCU INTERNAL FAULT	

BVCU External Fault Codes
Figure 203 (Sheet 4)

2) The display for the seven flights shown above is as follows, the display reads from top to bottom.
3) Read each display as after the flight with no ground self test faults:

FLIGHT NO. 1	2	3	4	5	6	7
CC --	CC --	CC --	CC --	CC --	CC --	CC --
AA	AA	AA	AA	AA	AA	AA
ED	ED	F0	F1	F0	F0	F1
		01	01	01	01	01
		BB --	BB --	BB	BB	BB
		ED	ED	F1	F0	F0
				01	01	01
				BB --	BB	BB
				ED	F1	F1
					01	01
					BB --	BB --
					ED	ED

NOTE: The code sequence between the underlined codes is shown three times.

(c) Example 2

1) Flight numbers and their fault status:

Flight No. 1 - Faults: 01 displayed after flight and during ground self test.
Flight No. 2 - Faults: 01 displayed after flight and during ground self test.
Flight No. 3 - Faults: 01 displayed after flight and during ground self test.
Flight No. 4 - Fault free
Flight No. 5 - Fault free
Flight No. 6 - Faults: BB displayed after flight and during ground self test.
Flight No. 7 - Faults: BB displayed after flight and during ground self test.
Flight No. 8 - Faults: BB displayed after flight and during ground self test.

2) The display for the eight flights shown above is as follows, the display reads from top to bottom.

3) Read each display as after the flight:

FLIGHT NO. 1	2	3	4	5	6	7	8
CC --	CC --	CC --	CC --	CC --	CC --	CC --	CC --
AA	AA	AA	AA	AA	AA	AA	AA
01	01	01	F1	F2	BB	BB	BB
FO	FO	FO	01	01	FO	FO	FO
01 --	01	01	FO	FO	BB	BB	BB
ED	FO	FO	01	01	F2	FO	FO
	01 --	01	FO	FO	01	BB	BB
	ED	FO	01 --	01 --	FO	F2	FO
		01 --	ED	ED	01 --	01 --	BB --
		ED			ED	ED	ED

NOTE: The code sequence between the underlined codes is shown three times.

TASK 75-32-00-702-003-R03

3. Interrogation of the TPU

A. General

(1) To do on-wing maintenance without additional test equipment, the TPU includes Built In Test Equipment (BITE).

(a) BITE monitors faults that occur in the TPU and in the related external equipment.

(2) Faults found are stored in the TPU memory and shown on the EICAS display MAINTENANCE page (AMM 31-41-00).

(a) A bleed valve control system fault that causes the message, L or R ENG SURGE BITE to be shown on the EICAS display MAINTENANCE page is not dispatch critical.

(3) TPU Fault Monitoring

(a) On each engine start, the TPU completes a self-test to make sure the TPU operates correctly.

1) On each engine start, the TPU completes a self-test to make sure the TPU operates correctly.

(b) Continuous monitoring is done when the engine is in operation and power is supplied to the TPU by the dedicated generator.

1) The TPU continuously monitors engine P4 pressure for the occurrence of a engine surge.

2) The TPU also does a self-check for internal and external faults in the TFU/TPU system.

(c) During engine start and continuous monitoring, faults found are stored in the TPU memory and the related message is shown on the EICAS display MAINTENANCE page.

1) A TPU/TFU system fault that causes the message L or R ENG SURGE BITE to be shown on the EICAS display MAINTENANCE page is not dispatch critical.

(d) Power for a ground test is supplied power to the TPU through the ground test switch (Fig. 204).

1) A self-test equivalent to the engine start self-test is done.

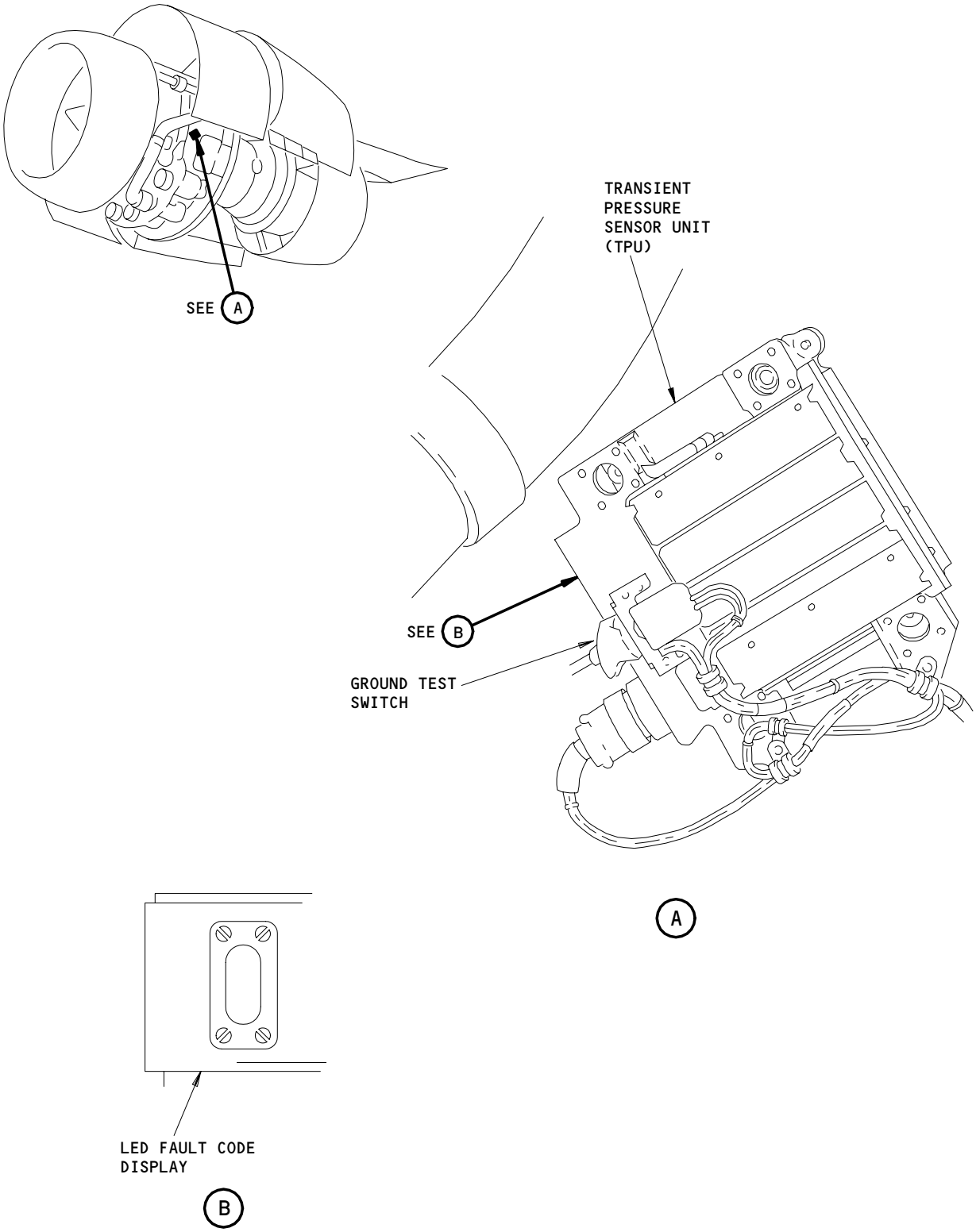
2) Faults found during this test and from flights before are shown as fault codes on the LED fault code display (Fig. 204).

3) Faults found during ground test are stored in the TPU memory.

(e) When you use the ground test routine, faults stored in the TPU memory are each identified by a fault code shown in the LED fault code display.

1) TPU interrogation is done in a fault code sequence (Fig. 205).

(f) Fault codes available for the interrogation of the TPU are shown in the TPU Fault Code Table (Fig. 206).



TPU Interrogation
Figure 204

DISPLAY	FUNCTION	DISPLAY TIME (SECS)
CC	Self-test in progress	11 (approx)
AA	Faults found during self-check will follow	0.5 on/0.5 off for 4 secs.
XX	Displays each fault found (during self-test) in turn, where XX is the discrete code for each fault. If no faults are found, this display is omitted	4 (each fault)
F(Y)	Where Y equals the number of fault free flights since last fault producing flight. After more than nine fault free flights, the F(Y) is replaced by FA	4
XX	Displays each fault found (during last flight in which a fault or faults were detected) in turn, where XX is the discrete code for each fault	4 (each fault)
ED	End of display	4

TPU Fault Code Sequence Table
Figure 205

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
10	L OR R ENG SURGE BITE – MAINTENANCE	P4 TRANSDUCER OR PROCESS	TPU WILL NOT DETECT SURGE. NON–RECOVERY FROM SURGE.
20	L OR R ENG SURGE BITE – MAINTENANCE	DGCU A OR B, OR GROUND TEST SWITCH	GROUND TEST IS IGNORED. A SINGLE DORMANT FAILURE DOES NOT AFFECT FUNCTIONAL OPERATION.
30	L OR R ENG SURGE BITE – MAINTENANCE	TFU SOLENOID OR WIRING	NON–RECOVERY FROM SURGE.
40	L OR R ENG SURGE BITE – MAINTENANCE	SURGE DETECTED	RECOVERY FROM SURGE. BVCU WILL OPERATE IN TRANSIENT MODE FOR REMAINDER OF FLIGHT.
50	L OR R ENG SURGE BITE – MAINTENANCE	TPU INTERNAL WIRING FAULT (IGNITION)	NON–RECOVERY FROM SURGE.
60	L OR R ENG SURGE BITE – MAINTENANCE	PLA TRANSDUCER OR WIRING	BVCU WILL OPERATE IN TRANSIENT MODE.
90	L OR R ENG SURGE BITE – MAINTENANCE	EICAS MAINTENANCE LINE FAULT OR LOSS OF POWER TO THE SYSTEM; OR, MAINTENANCE LINE GROUNDED BY THE BVCU (BECAUSE OF THE BVCU FAULT CODES)	EICAS NOT GIVEN A SIGNAL OF TPU/BVCU FAULTS.
B1	L OR R ENG SURGE BITE – MAINTENANCE	INTERNAL UNIT FAULT – RELATED WITH THE P4 TRANSDUCER	TPU WILL NOT DETECT SURGE. NON–RECOVERY FROM SURGE.
B3	L OR R ENG SURGE BITE – MAINTENANCE	INTERNAL UNIT FAULT – RELATED WITH TFU	NON–RECOVERY FROM SURGE.
B5	L OR R ENG SURGE BITE – MAINTENANCE	INTERNAL UNIT FAULT – RELATED WITH THE IGNITION RELAYS AND DRIVE	NON–RECOVERY FROM SURGE.
B6	L OR R ENG SURGE BITE – MAINTENANCE	INTERNAL UNIT FAULT – RELATED TO PLA RELAY	BVCU WILL POSSIBLY GO INTO TRANSIENT MODE.
B9	L OR R ENG SURGE BITE – MAINTENANCE	INTERNAL UNIT FAULT – RELATED TO EICAS MAINTENANCE RELAY AND DRIVE	EICAS NOT GIVEN A SIGNAL OF FAULTS.
BE	L OR R ENG SURGE BITE – MAINTENANCE	INTERNAL UNIT FAULT – RELATED TO THE P4 DRIVE AND THE 15 VOLT REFERENCE RANGE	TPU WILL NOT DETECT SURGE. NON–RECOVERY FROM SURGE.
BF	L OR R ENG SURGE BITE – MAINTENANCE	INTERNAL UNIT FAULT	TPU WILL NOT DETECT SURGE. NON–RECOVERY FROM SURGE.

NOTE: TPU FAULT CODE "40" WILL BE SHOWN WITH THE BVCU FAULT CODE "04".

TPU Fault Codes
Figure 206

COMPRESSOR BLEED CONTROL SYSTEM - MAINTENANCE PRACTICES

1. General
   A. This procedure has two tasks:
      (1) The first task has interrogation of the bleed valve control unit added by SB 75-B506, SB 75-C267, SB 75-C694 or SB 75-C824.
      (2) The second task has interrogation of the transient pressure sensor unit.
   B. Service Bulletins referred to:
      (1) SB 75-8070 Compressor bleed valve transient pressure sensor unit - Introduction of an ETPU100-02B.
      (2) SB 71-8071 Revised harness clipping to suit the re-positioned ground test switch on the engine transient pressure sensor unit type number ETPU100-02B.
      (3) SB 71-8125 Light duty electrical harness - Transient pressure unit (TPU) - Deletion of acceleration control unit (ACU) reset line, status line and ignition relay lines.
      (4) SB 71-8126 Light duty electrical harness - Introduction of electrical harness looms produces by production type methods and introduced as an alternative to SB RB211-71-8125 in field rework standard.
      (5) SB 75-8137 Airflow control regulator and actuator - Revised transient pressure unit ground test switch and associated guard.
      (6) SB 74-8302 Deletion of ignition relay assembly.
      (7) SB 75-8315 Compressor bleed valves transient pressure sensor unit - Introduction of revised software to combat spurious fault signals (TPU) unit type number ETPU100-02C).
      (8) SB 71-8346 Power Plant - Light duty electrical harness - Loom C - Interchange of scheduling logic between HP3 (1) and HP3 (2) bleed valve solenoids to reduce excessive aircraft cabin noise.
      (9) SB 75-9490 Air - HP and IP bleed - Air flow control - HP and IP bleed controller with revised software to combat spurious fault indications.
      (10) SB 75-B506 Air - HP and IP bleed - Air flow control - Unit. Deletion of status message annunciation.

(11) SB 75-B699 Air Compressor bleed valves- Transient pressure sensor unit- re-identification of units reincorporating a group of previously approved modifications.
(12) SB 75-C267 Air/HP/IP bleed-air flow control unit - Introduction of a HP and IP bleed controller with revised bleed schedule.
(13) SB 75-C694 Air/HP/IP bleed-air flow control unit - Introduction of revised BVCU C8E38-14.
(14) SB 75-C824 Air/HP/IP - Airflow control unit - Conversion of a HP and IP Bleed Controller Type C8E38-12 to a C8E38-15.
(15) SB 75-B945 Air Flow Control Regulator and Actuator - Introduction of Engine Transient Pressure Unit incorporating Application specific integrated circuits (TPU type No. ETPU200-01).
(16) SB 75-C823 Air Flow Control Regulator and Actuator - Introduction of an Engine Transient Pressure Unit to provision for a possible future revision to the engine HP system (TPU type No. ETPU300-01).

TASK 75-32-00-752-001-R04

2. Interrogation of Bleed Valve Control Unit (BVCU) (Fig. 201)

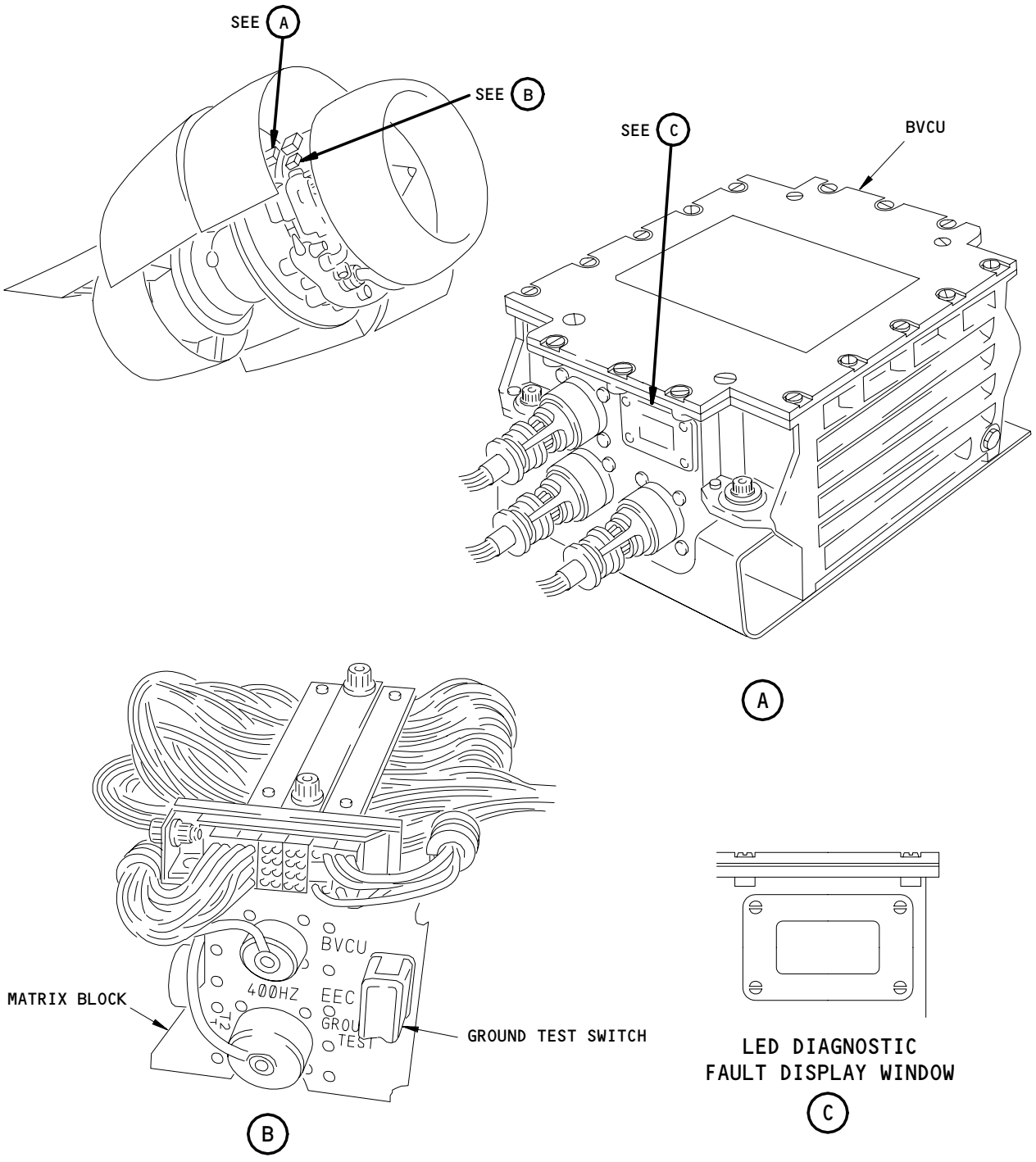
A. General

(1) To do the on-wing maintenance without additional test equipment, the BVCU includes built in test equipment (BITE). BITE monitors faults that may occur in the BVCU and in the related external sensors.
(2) Faults are stored in the BVCU memory and are shown on the engine indication and crew alerting system (EICAS) MAINTENANCE page. The fault will cause the message 'L or R ENG SURGE BITE' to be shown on the EICAS display maintenance page. A bleed valve control system fault that causes the message 'L or R ENG SURGE BITE' to be shown on the EICAS display maintenance page is not dispatch critical.

B. Procedure

S 742-006-R04

(1) BVCU Fault Monitoring is done in three ways:
(a) Ground test - when unit is supply with power through ground test switch, checks for unit or system dormant failures. Faults found during this test, and from the last three flights, are shown by a two-digit hexadecimal light emitting diode (LED) display on the BVCU.
(b) Continuous monitoring - is done when the engine is running and dedicated generator is energizing the unit. Fault that are found will be shown by an EICAS MAINTENANCE message, and logged in the BVCU memory.
(c) During continuous monitoring faults found are shown on the EICAS MAINTENANCE page (AMM 31-41-00). A bleed valve control system fault will cause the message 'L or R ENG SURGE BITE' to be showned on the EICAS maintenance page. A bleed valve control system fault that causes the message 'L or R ENG SURGE BITE' to be shown on the EICAS display maintenance page is not dispatch critical.

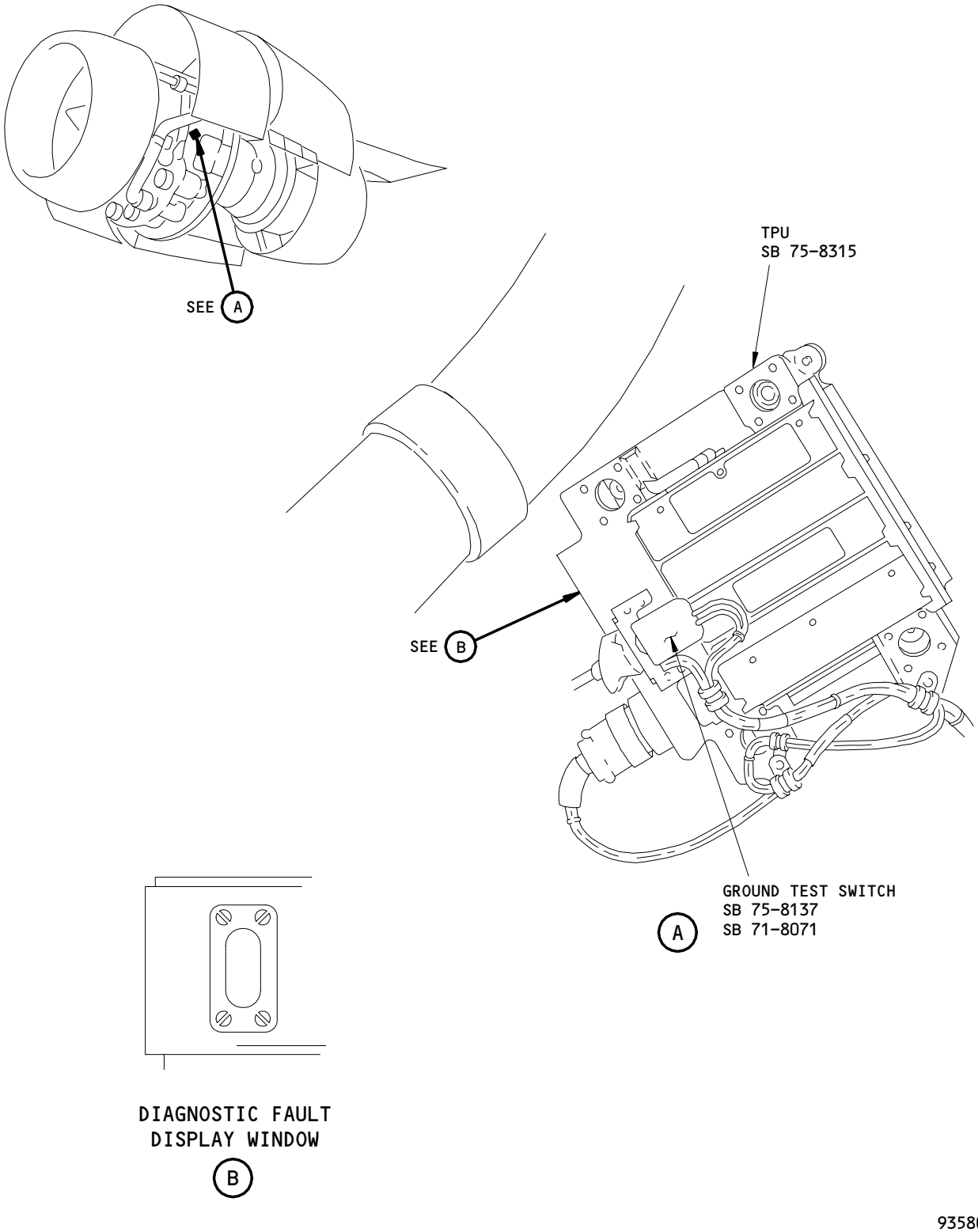


79793

BVCU Interrogation
Figure 201

EFFECTIVITY
RB211-535E4 ENGINES WITH BVCU C8E38-11, C8E38-12, C8E38-14 OR C8E38-15

F26453



TPU Interrogation
Figure 202

S 742-007-R04

(2) Fault code sequence

(a) When you use the ground test routine, faults stored in the BVCU memory are each identified by a fault code (see Table 203) displayed in the LED window (see Fig. 202). BVCU interrogation is done in the sequence shown in Table 201. All of the codes not including codes CC and ED, shows up three times.

BVCU Fault Code Sequence
Table 201

DISPLAY *[1]	FUNCTION	DISPLAY TIME
CC	Self test in progress	30 seconds
AA	Flashing four times - indicates memory code sequence about to commence	
XX	Displays each fault found during self test - 'XX' being a discrete code for each fault. If no fault found, this display is omitted	4 seconds each fault
F0	Last flight marker	4 seconds
XX	Displays each fault found during last flight	4 seconds each fault
F1	Second to last flight	4 seconds
XX	Displays each fault found during second to last flight	4 seconds each fault
F2	Third to last flight	4 seconds
XX	Displays each fault found during third to last flight	4 seconds each fault
ED	End of display	10 seconds

*[1] The flight marker indicators F0, F1, and F2 will not be displayed on a BVCU which has never detected a fault since its last bench check. Once a fault is detected, flight markers will remain until the next bench check. This is normal operation and no action is required.

S 742-008-R04

(3) Fault Code Display

(a) The example that follow shows the fault codes that may be shown over eight flights.

1) Flight numbers and their fault status:

Flight No. 1	Fault free
Flight No. 2	Fault free
Flight No. 3	Faults: 73, 10, 11 displayed
Flight No. 4	Fault free
Flight No. 5	Faults: 73, 10, 11 displayed
Flight No. 6	Fault free
Flight No. 7	Fault free
Flight No. 8	Fault free

(b) The display for the eight flights showned above is as follows. The display reads from top to bottom. Read each display as after the flight with no ground self test faults:

NOTE: The code sequence between underlined codes is shown three times.

Flight	1	2	3	4	5	6	7	8
	CC --	CC --	CC --	CC --	CC --	CC --	CC --	CC --
	AA --	AA --	AA	AA	AA	AA	AA	AA
	ED	ED	FO	FO	FO	FO	FO	FO
			73	F1	73	F1	F1	F1
			10	73	10	73	F2	F2 --
			11 --	10	11	10	73	ED
			ED	11 --	F1	11	10	
				ED	F2	F2 --	11 --	
					73	ED	ED	
					10			
					11 --			
					ED			

(c) The above example is an indication of how the fault codes would have changed if a BITE test has been done after each flight. This is not a recommended practice. The example shows that a fault which occurs occasionally will disappear from the fault display after three fault free flights. All subsequent flights that are fault free will have the same display as flight 8 in the above example.

(d) If the fault has been found during the self check when the ground test was done then the fault code would be shown between AA and FO.

S 742-009-R04

(4) Fault Codes Available to BVCU

(a) Table 202 lists the fault codes, their locations, and their groups of fault.

BVCU Fault Codes
Table 202

FAULT CODE	BVCU EXTERNAL FAULT CODES TABLE	GROUP OF FAULT
0X	203	External
1X	203	External
2X	203	PLA signal process
3X	203	N/√T2 signal process
4X	203	Internal logic
5X	203	Transient detection
6X	203	Power supply
7X	203	Output stage
9X	203	N2 process and DDU function

(b) Table 203 shows the fault codes available for interrogating the BVCU together with other relevant information.

NOTE: Fault codes apply to all of RB211-535E4 engines unless noted.

BVCU External Fault Codes
Table 203

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
01	L or E ENG SURGE BITE - MAINTENANCE	Continuity fault in wiring between altitude switch and BVCU	Bleed valves operate in high altitude mode, i.e. higher level of N2/√T2
02	L or R ENG SURGE BITE - MAINTENANCE	N2/√T2 No. 1 speed probe fault	1. PLA will override N2/√T2 schedule and control bleed valve opening and closing. 2. DDU channel 1 inoperative
04	L or R ENG SURGE BITE - MAINTENANCE	PLA fault. Open circuit input or output coil on PLA transducer open circuit wiring PLA/BVCU/TPU or TPU 'Tripped'	Bleed valves will operate in transient mode, i. e. at higher level of N2/√T2
05	L or R ENG SURGE BITE - MAINTENANCE	T2 thermocouple signal fault	PLA will override N2/√T2 schedule and control bleed valve opening and closing
06	L or R ENG SURGE BITE - MAINTENANCE	DGCU 'A' fault, or open circuit discrete signal wire from DGCU 'A' to BVCU	No effect unless DGCU 'B' also faulty
07	L or R ENG SURGE BITE - MAINTENANCE	DGCU 'B' fault, or open circuit discrete signal wire from DGCU 'B' to BVCU	No effect unless DGCU 'A' also faulty
10	L or R ENG SURGE BITE - MAINTENANCE	HP solenoid No. 2 (Engines with SB 71-8346) open circuit on coil 'A' or 'B"	No effect unless both coils open circuit
11	L or R ENG SURGE BITE - MAINTENANCE	HP solenoid No. 1 (Engines with SB 71-8346) open circuit on coil 'A' or 'B'	No effect unless both coils open circuit

BVCU External Fault Codes
Table 203

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
12	L or R ENG SURGE BITE - MAINTENANCE	IP group 1 bleed valve solenoid open circuit on coil 'A' or 'B'	No effect unless both coils open circuit
13	L or R ENG SURGE BITE - MAINTENANCE	IP group 2 bleed valve solenoid open circuit on coil 'A' or 'B'	No effect unless both coils open circuit
16	L or R ENG SURGE BITE - MAINTENANCE	PLA transducer incorrectly set	Incorrect scheduling on PLA override
18	L or R ENG SURGE BITE - MAINTENANCE	HP2 'A' solenoid open circuit	No effect unless code 19 also set
19	L or R ENG SURGE BITE - MAINTENANCE	HP2 'B' solenoid open circuit	No effect unless code 18 also set
21	L or R ENG SURGE BITE - MAINTENANCE	PLA loss of signal	Bleed valves operate in transient mode i.e., at higher level of N2/√T2
22	L or R ENG SURGE BITE - MAINTENANCE	PLA do not operate high	Bleed valves operate in transient mode i.e., at higher level of N2/√T2
23	L or R ENG SURGE BITE - MAINTENANCE	PLA consistency check failure	No effect, unless operating in PLA backup schedule, when valve schedule may be incorrect
24	L or R ENG SURGE BITE - MAINTENANCE	Forward PLA not found	Only reverse thrust schedule available
25	L or R ENG SURGE BITE - MAINTENANCE	Reverse PLA not found	Only forward thrust schedule available

BVCU External Fault Codes
Table 203

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
31	L or R ENG SURGE BITE - MAINTENANCE	N2/√T2 out of range	PLA will override N2/√T2 schedule and control bleed valve opening and closing
32	L or R ENG SURGE BITE - MAINTENANCE	T2 shaper out of range	PLA will override N2/√T2 schedule and control bleed valve opening and closing
33	L or R ENG SURGE BITE - MAINTENANCE	Frequency to voltage failure	PLA will override N2/√T2 schedule and control bleed valve opening and closing
34	L or R ENG SURGE BITE - MAINTENANCE	N2/√T2 steady state failure found	Bleed valves operate in transient mode i.e., at higher level of N2/√T2
40	L or R ENG SURGE BITE - MAINTENANCE	T2 inject fail	PLA may override N2/√T2 schedule and control bleed valve opening and closing
41	L or R ENG SURGE BITE - MAINTENANCE	Prom 1 fault	HP3.2, IP1 valves fail open, HP2 valve fails closed
42	L or R ENG SURGE BITE - MAINTENANCE	Prom 2 fault	HP3.1 valve fails closed, IP2 valve fails open
43	L or R ENG SURGE BITE - MAINTENANCE	Prom 3 fault	Transient/steady state found may be incorrect
44	L or R ENG SURGE BITE - MAINTENANCE	PLA override	PLA will override N2/√T2 schedule and control bleed valve opening and closing
51	L or R ENG SURGE BITE - MAINTENANCE	Transient state failure found	N2/√T2 schedule uses steady state switch points only

BVCU External Fault Codes
Table 203

FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
53	L or R ENG SURGE BITE - MAINTENANCE	PLA (high) transient state failure found	N2/√T2 schedule above 211 N2/√T2 units uses steady state switch points even though PLA (high) transient conditions are present
54	L or R ENG SURGE BITE - MAINTENANCE	PLA (high) steady state failure found	Bleed valves operates in transient mode i.e., at higher lever of N2/√T2
55	L or R ENG SURGE BITE - MAINTENANCE	PLA (low) transient state failure found	N2/√T2 schedule below 211 N2/√T2 units uses steady state switch points even though PLA (low) transient conditions are present
56	L or R ENG SURGE BITE - MAINTENANCE	PLA (low) steady state failure found	Bleed vavles operate in transient mode i.e., at higher level of N2/√T2
60	L or R ENG SURGE BITE - MAINTENANCE	Flap signal processing failure	Bleed valves operate in transient mode i.e., at higher level of N2/√T2
62	L or R ENG SURGE BITE - MAINTENANCE	+15V power supply failure	HP3.2 and IP valves fail open, HP3.1 and HP2 valves fail closed (fail safe state)
63	L or R ENG SURGE BITE - MAINTENANCE	-15V power supply failure	HP3.2 and IP valves fail open, HP3.1 and HP2 valves fail closed (fail safe state)
64	L or R ENG SURGE BITE - MAINTENANCE	-15V monitor failure	HP3.2 IP valves fail open, HP3.1 and HP2 valves fail closed (fail safe state)
65	L or R ENG SURGE BITE - MAINTENANCE	5V (B) power supply failure	HP3.2, IP1 valves fail open, HP2 valve fails closed

BVCU External Fault Codes Table 203			
FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
71 (with 12 & 13)	L or R ENG SURGE BITE - MAINTENANCE	IP drive open circuit	IP1 or IP2 valves permanently open
72 (with 12 & 13)	L or R ENG SURGE BITE - MAINTENANCE	IP drive short circuit	IP1 or IP2 valves permanently closed
73 (with 10 & 11)	L or R ENG SURGE BITE - MAINTENANCE	HP3 drive open circuit	HP3.1 or HP3.2 in incorrect state
74	L or R ENG SURGE BITE - MAINTENANCE	Solenoid drive failed open	Either HP3 valve or either IP valve open at high speed
75	L or R ENG SURGE BITE - MAINTENANCE	Throttle lever is not at idle or HP3 solenoid drive failed on.	None, or HP3.1 valve permanently closed or HP3.2 valve permanently open.
76	L or R ENG SURGE BITE - MAINTENANCE	IP solenoid drive failed on	Either IP valve permanently closed
77 (& 18)	L or R ENG SURGE BITE - MAINTENANCE	HP2 drive open circuit	HP2 valve permanently closed
79 (& 18)	L or R ENG SURGE BITE - MAINTENANCE	HP2 drive short circuit	HP2 valve permanently open
7D	L or R ENG SURGE BITE - MAINTENANCE	HP2 valve failed closed	HP2 valve permanently closed
7E	L or R ENG SURGE BITE - MAINTENANCE	HP2 valve failure	HP2 valve permanently open

BVCU External Fault Codes Table 203			
FAULT CODE	EICAS MESSAGE	FAULT DESCRIPTION	EFFECT ON SYSTEM
91	L or R ENG SURGE BITE - MAINTENANCE	DDU channel 1 fault. Channel inoperative	In event of surge only HP bleed valve No. 2 will open
92	L or R ENG SURGE BITE - MAINTENANCE	DDU channel 2 fault. Channel inoperative	In event of surge only HP bleed valve No. 1 will open
93	L or R ENG SURGE BITE - MAINTENANCE	Processed N2(1) and N2(2) inconsistent	DDU may be inoperative
94	L or R ENG SURGE BITE - MAINTENANCE	N2(1) signal processing fault	DDU channel 1 inoperative
95	L or R ENG SURGE BITE - MAINTENANCE	N2(2) fail or N2(2) signal processing	DDU channel 2 inoperative

TASK 75-32-00-752-002-R04

3. Interrogation of Engine Transient Pressure Sensor Unit (TPU) (Fig. 202)
   A. General
      (1) To do on-wing maintenance without additional test equipment, the TPU includes built in test equipment (BITE). BITE monitors faults that may occur in the transient pressure sensor unit/transient fuel valve unit (TPU/TFU) system.
      (2) Faults found are stored in the engine indication and crew alerting system (EICAS) MAINTENANCE page and the relevant fault codes stored in the TPU memory.
      (3) All faults are in the group of MAINTENANCE faults.
      (4) Fault monitoring of the TPU is done in three ways:
         (a) Self test - on every engine start the TPU checks for unit and system dormant failures. Fault found will be shown by an EICAS message L or R ENG SURGE BITE, stored in the MAINTENANCE page and the relevant fault code stored in the TPU memory.
         (b) Continuous monitoring - is done when engine is running and dedicated generator is powering the unit. Fault found will be shown by an EICAS maintenance message, stored in the EICAS MAINTENANCE page L or R ENG SURGE BITE and the relevant fault code stored in the TPU memory.

(c) Ground test - when unit is powered through ground test switch, done same as self test as (a). Faults found during this test, and from previous flights, are displayed on a two digit hexadecimal display on the TPU.

NOTE: ENGINES WITHOUT SB 75-7137;
The TPU ground test switch is a three position switch spring loaded to the central position. To power up the TPU the test switch must be pushed upward to the ON position and held against spring pressure. When the switch is released, or if it is selected downward to the OFF position, the power will be off.

B. Procedure

S 742-003-R04

(1) Fault code sequence

(a) When you use the ground test routine, faults stored in the TPU memory are each identified by a fault code in the display (See Table 206). Table 204 and Table 204A shows TPU interrogation sequence.

TPU Fault Code Sequence Table 204		
DISPLAY	FUNCTION	DISPLAY TIME (SECONDS)
CC	Self check in progress	11 (approx)
AA	Faults found during self check will follow	0.5 on/0.5 off for 4 secs.
'XX'	Shows each fault found during self test - 'XX' being a discrete code for each fault. If no fault found, this display is ignored	4 (each fault)
F'Y'	'Y' = Number of flights (defined as number of occasions on which DGCU 'A' or DGCU 'B' go high after power up) during which no faults have been found. To a maximum of nine flights, after which: ENGINES WITH SB 75-8315; (TPU type No. ETPU 100-2C) FA will be shown or ENGINES WITH SB 75-B699 (TPU type No. ETPU 100-3C) FA will be shown	4
'XX'	Shows each fault found (during last flight in which a fault or faults were found) in turn, where 'XX' is the discrete code for each fault.	4 (each fault)
ED	End of display	4

TPU Fault Code Sequence Table 204A *[1]		
DISPLAY	FUNCTION	DISPLAY TIME (SECONDS)
CC	Self check in progress	11 (approx)
AA	Faults found during self check will follow	0.5 on/0.5 off for 4 secs.
'XX'	Shows each fault found during self test - 'XX' being a discrete code for each fault. If no fault found, this display is ignored	4 (each fault)
F'Y'	'Y' = Number of flights (defined as number of occasions on which DGCU 'A' or DGCU 'B' go high after power up) during which no faults have been found. To a maximum of four flights, after which this will not be displayed on engines Post RR SB 75-B945 (TPU type No. ETPU 200-01) or engines Post RR SB 75-C823 (TPU type No. ETPU 300-01). (See Note 1)	4
'XX'	Shows each fault found (during last flight in which a fault or faults were found) in turn, where 'XX' is the discrete code for each fault.	4 (each fault)
ED	End of display	4

*[1] For units which have completed 5 or more fault free flights, the Bite check will display:
CC AA ED

S 742-004-R04

(2) Fault Codes Available to TPU

(a) Table 205 list TPU fault codes and their locations.

TPU Fault Codes Table 205	
ENGINES POST SB 75-8315 (TPU TYPE NO. ETPU 100-2C), ENGINES POST SB 75-B699 (TPU TYPE NO. ETPU 100-3C), ENGINES POST SB 75-7945 (TPU TYPE NO. ETPU 200-01), or ENGINES POST SB 75-C823 (TPU TYPE NO. ETPU 300-01)	
FAULT CODE	TPU FAULT CODES TABLE
10	206
20	206
30	206
40	206
50	206
60	206
90	206
B1	206
B3	206
B5	206
B6	206
B9	206
BE	206
BF	206

(b) ENGINES POST-RR-SB 75-8315 (TPU TYPE NO. ETPU 100-2C);
ENGINES POST-RR-SB 75-B699 (TPU TYPE NO. ETPU 100-3C);
ENGINES POST-RR-SB 75-B945 (TPU TYPE NO. ETPU 200-01);
ENGINES POST-RR-SB 75-C823 (TPU TYPE NO. ETPU 300-01);
Table 206 shows the fault codes available for interrogation.

TPU Fault Codes Table 206		
TPU FAULT CODE DISPLAY	EICAS DISPLAY	FAULT
10	L or R ENG SURGE BITE - MAINTENANCE	P4 transducer or process
20	L or R ENG SURGE BITE - MAINTENANCE	DGCU 'A' or 'B, or ground test switch
30	L or R ENG SURGE BITE - MAINTENANCE	TFU solenoid or wiring
40 *[1]	L or R ENG SURGE BITE - MAINTENANCE	Surge found or P4 transducer fault
50	L or R ENG SURGE BITE - MAINTENANCE	Internal unit fault — associated with ignition
60	L or R ENG SURGE BITE - MAINTENANCE	PLA transducer or wiring
90	L or R ENG SURGE BITE - MAINTENANCE	EICAS maintenance line fault or system depowered or maintenance line grounded by BVCU (due to BVCU codes being present)
B1	L or R ENG SURGE BITE - MAINTENANCE	Internal unit fault - related to P4 transducer
B3	L or R ENG SURGE BITE - MAINTENANCE	Internal unit fault - related with TFU

TPU Fault Codes Table 206		
TPU FAULT CODE DISPLAY	EICAS DISPLAY	FAULT
B5	L or R ENG SURGE BITE - MAINTENANCE	Internal unit fault - related with ignition relays and drive
B6	L or R ENG SURGE BITE - MAINTENANCE	Internal unit fault - related with PLA
B9	L or R ENG SURGE BITE - MAINTENANCE	Internal unit fault - EICAS maintenance relays and drive
BE	L or R ENG SURGE BITE - MAINTENANCE	Internal unit fault - P4 drive and 15 volt reference range
BF	L or R ENG SURGE BITE - MAINTENANCE	Internal unit fault

*[1] Code 40 will be accompanied by BVCU code 04

BLEED VALVE CONTROL UNIT (BVCU) - MAINTENANCE PRACTICES

1. General
   A. This procedure gives the steps to look at the fault codes on the Bleed Valve Control Unit (BVCU).

   TASK 75-32-01-742-002-R00

2. BVCU BITE Procedure
   A. References
      (1) AMM 24-22-00/201, Electrical Power-Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
      (3) FIM 75-32-00/101, Compressor Bleed Control System
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414AR Right Fan Cowl Panel (L Engine)
          424AR Right Fan Cowl Panel (R Engine)

   C. Do the BVCU BITE Procedure

      S 862-003-R00
      (1) Supply the electrical power (AMM 24-22-00/201).

      S 862-004-R00
      (2) For the left engine, make sure this circuit breaker is closed:
          (a) P11-2 Overhead Circuit Breaker Panel
              1) 11D21, ENGINES HP BLD VLV LEFT

      S 862-005-R00
      (3) For the right engine, make sure this circuit breaker is closed:
          (a) P11-2 Overhead Circuit Breaker Panel
              1) 11D22, ENGINES HP BLD VLV RIGHT

      S 022-020-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

      (4) Open the right fan cowl panel (AMM 71-11-04/201).

      S 742-006-R00
      (5) Put the BVCU/EEC ground test switch to the BVCU position.

S 812-007-R00

(6) If there are fault codes shown in the fault code window, do the corrective action for those fault codes (FIM 75-32-00/101).

S 862-008-R00

(7) Remove the electrical power, if it is not necessary.

S 412-009-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(8) Close the right fan cowl panel (AMM 71-11-04/201).

BLEED VALVE CONTROL UNIT (BVCU) - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is the removal of the Bleed Valve Control Unit (BVCU). The second task is the installation of the BVCU.
   B. Use the procedures given in AMM 70-02-01/201 for identification, lubricant and installation of rubber seal rings.
   C. Use the procedures given in AMM 70-50-02/201 for connection of electrical plugs.
   D. Use the procedures given in AMM 70-51-00/201 to tighten fasteners.
   E. Tighten the fasteners to the torque values given in AMM 70-51-00/201 unless a torque value is specified in this procedure.

TASK 75-32-01-004-001-R00

2. Remove the Bleed Valve Control Unit (BVCU)
   A. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          414AR Fan Cowl Panel (RH)
          424AR Fan Cowl Panel (RH)

   C. Prepare to Remove the Bleed Valve Control Unit

      S 864-002-R00
      (1) For the left engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:
          (a) P11-2 Overhead Circuit Breaker Panel
              1) 11D21, ENGINES HP BLD VLV LEFT

      S 864-003-R00
      (2) For the right engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:
          (a) P11-2 Overhead Circuit Breaker Panel
              1) 11D22, ENGINES HP BLD VLV RIGHT

S 014-058-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(3) Open the right fan cowl panel (AMM 71-11-04/201).

D. Remove the Bleed Valve Control Unit (Fig. 401)

S 034-008-R00

(1) Disconnect the electrical connectors (1), (2) and (7).

NOTE: ENGINES POST-RR-SB 71-8346;
The wiring loom adjacent to the electrical connector D1364 is identified with yellow sleeve tape.

S 034-013-R00

(2) ENGINES POST-RR-SB 71-8891;
Remove the bolt (8) that attaches the bonding strap (10) to the bracket (12) on the fan containment casing/rear casing joint flange.

NOTE: The bonding strap is an important part of BVCU.

S 034-018-R00

(3) Hold the BVCU (3) and remove the bolts (4) that attach the BVCU to the support bracket (6).

S 024-019-R00

(4) Remove the BVCU (3).

S 434-022-R00

(5) Install the dust caps to all open connectors.

TASK 75-32-01-404-023-R00

3. Install the Bleed Valve Control Unit (BVCU)

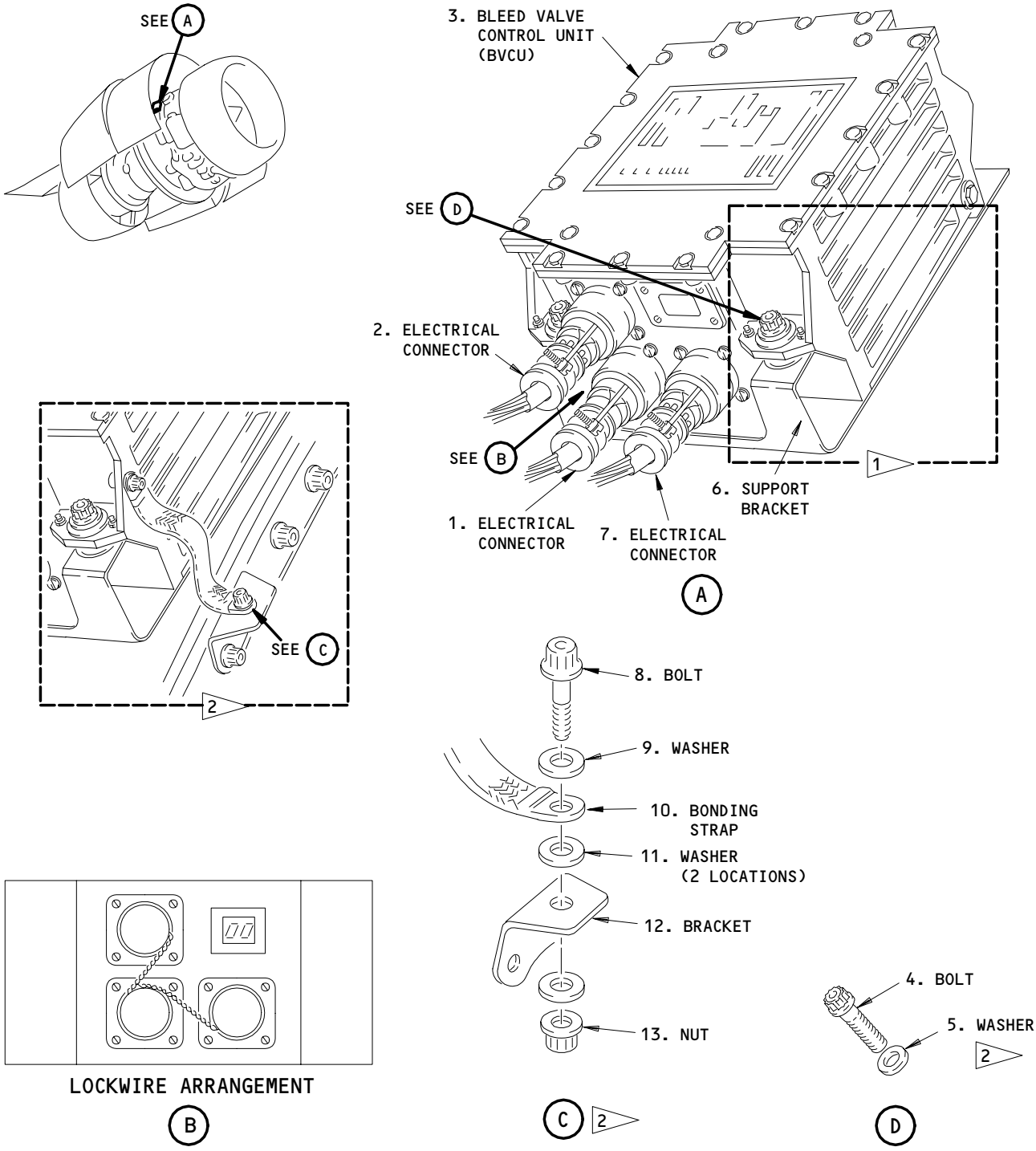
A. Consumable Materials

(1) Degreasing Fluid
(Inhibited and stabilized 1.1.1. trichloroethane)
British Spec/Ref - B.S. 4487, 1969
American Spec/Ref - MIL-T-81533
OMat No. 1/21

(2) Lint-free cloth - Local resources

(3) Lockwire - Chromium - Nickel Stabilized Steel
(0.018 inch (0.45 mm) dia)

B. Parts



1 ENGINES WITHOUT RR SB 71-8891

2 ENGINES WITH RR SB 71-8891

68663

Bleed Valve Control Unit (BVCU) Installation
Figure 401

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	3	Bleed Valve Control Unit	75-32-01	01	25
	4	Bolt			7
	5	Washer			15
	8	Bolt			4
	9	Washer			13
	11	Washer			12
	13	Nut			17

C. References
(1) AMM 71-11-04/201, Fan Cowl Panels
(2) AMM 75-32-00/201, Compressor Bleed Control System

D. Access
(1) Location Zones
410 Left Engine
420 Right Engine

(2) Access Panels
414AR Fan Cowl Panel (RH)
424AR Fan Cowl Panel (RH)

E. Procedure (Fig. 401)

S 034-025-R00

(1) Remove the dust caps from the electrical connectors.

S 414-073-R00

CAUTION: ENGINES PRE-RR-SB 75-C737;
DO NOT INSTALL BVCU -15. ONLY BVCU -9, -11 OR -12 MAY BE INSTALLED OR FAILURE OF THE BITE DISPLAY WILL OCCUR.

ENGINES POST-RR-SB 71-C737;
ONLY INSTALL BVCU -15. IF BVCU -9, -11 OR -12 IS INSTALLED FAILURE OF THE BITE DISPLAY WILL OCCUR.

(2) Put the BVCU (3) on the support bracket (6) and attach it with bolts (4) and washers (5).
(a) Tighten the bolts (4).

S 114-034-R00

(3) ENGINES POST-RR-SB 71-8891;
Clean the mating surfaces of bracket (12), washer (9, 11) and bonding strap (10) as follows:

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

IF THE DEGREASING FLUID TOUCHES THE ENAMELED SURFACE, REPAIR THE SURFACE (AMM 70-42-12/201). FAILURE TO FOLLOW AMM 70-42-12/201 WILL CAUSE DAMAGE TO THE ENGINE SURFACE.

(a) Put degreasing fluid on a clean, dry, lint-free cloth until it is moist.

NOTE: Put the degreasing fluid on the cloth away from the container to prevent contamination of the bulk liquid.

(b) Remove the contamination from the mating surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 434-038-R00

(4) ENGINES POST-RR-SB 71-8891;
Install the bolt (8), nut (13), washer (9, 11) and bonding strap (10) to the bracket (12) attached to the fan containment casing/rear casing joint flange.
(a) Tighten the nut (13) to 320 inch-pounds (36 newton-meters).

S 434-059-R00

CAUTION: MAKE SURE ALL LIQUID AND SOLID CONTAMINATION IS REMOVED FROM THE ELECTRICAL CONNECTORS BEFORE YOU CONNECT THEM.

(5) Install the electrical connectors (1), (2) and (7).

NOTE: ENGINES POST-RR-SB 71-8346;
The wiring loom adjacent to the electrical connector D1364 is identified with yellow sleeve tape.

(a) Install a lockwire.

S 864-045-R00

(6) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D21, ENGINES HP BLD VLV LEFT

S 864-046-R00

(7) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D22, ENGINES HP BLD VLV RIGHT

S 734-076-R00

(8) Do the BVCU Interrogation procedure (AMM 75-32-00/201).

NOTE: If the BVCU does not operate, refer to the CAUTION statement in paragraph E before you begin the fault isolation procedure.

S 414-048-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(9) Close the right fan cowl panel (AMM 71-11-04/201).

S 734-078-R00

(10) Do the tests listed in the Power Plant Test Reference Table (AMM 71-00-00/501).

IP COMPRESSOR BLEED VALVES - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the IP Compressor Bleed Valves. The second task is to install the IP Compressor Bleed Valves.
   B. This procedure applies to all six bleed valves.
   C. Use the procedures given in AMM 70-51-00/201 to tighten fasteners.
   D. Tighten the fasteners to the torque values given in AMM 70-51-00/201 unless a torque value is specified in this procedure.

TASK 75-32-02-004-001-R00

2. Remove the IP Compressor Bleed Valve
   A. References
      (1) AMM 72-03-01/401, Compressor Fairings
      (2) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          415AL Thrust Reverser, Left Engine
          416AR Thrust Reverser, Left Engine
          425AL Thrust Reverser, Right Engine
          426AR Thrust Reverser, Right Engine

   C. Procedure (Fig. 401)

      S 944-003-R00
      (1) Install a protective work mat in the fan case.

      S 014-004-R00

      WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

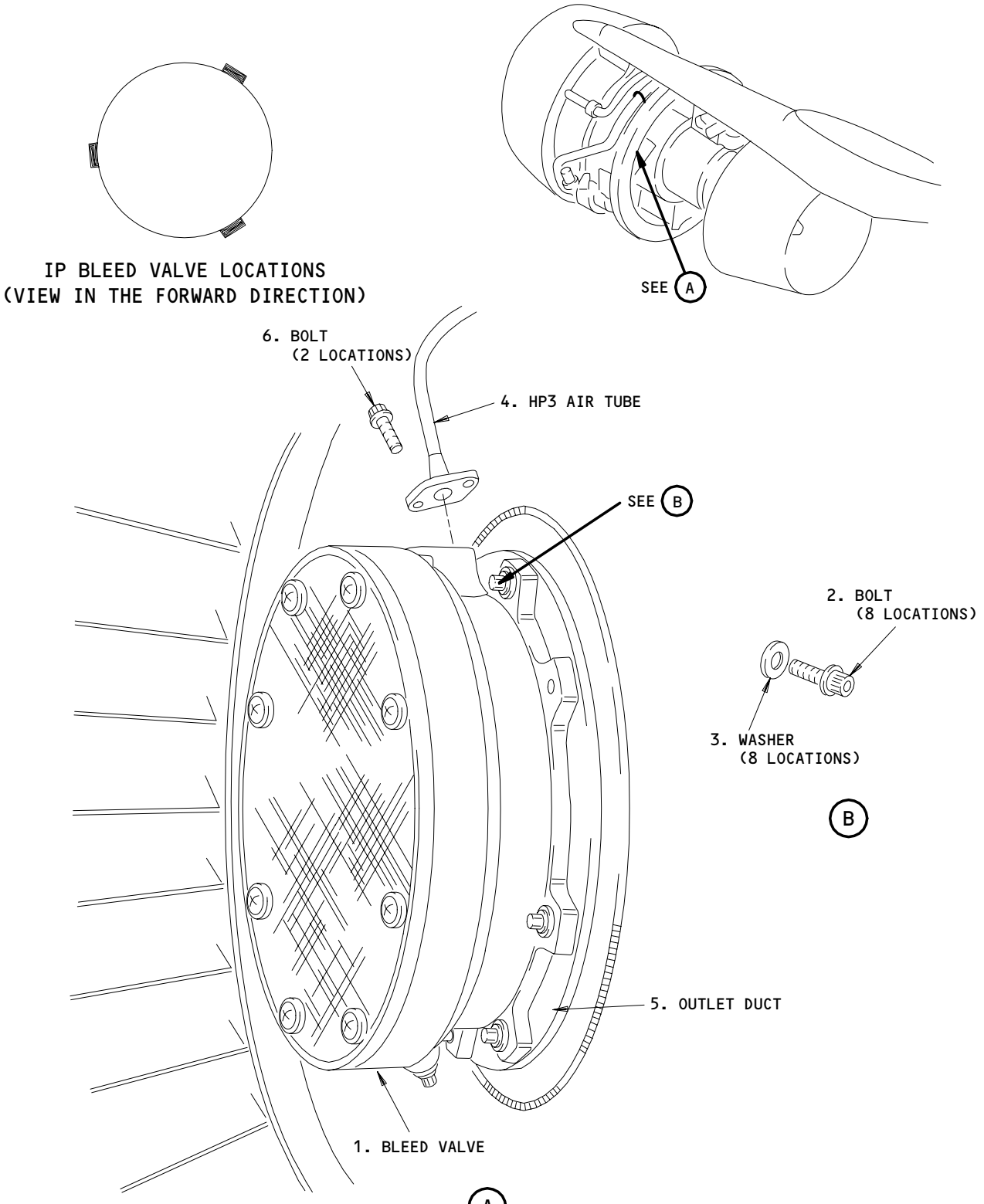
      (2) Open the thrust reversers (AMM 78-31-00/201).

      S 014-005-R00
      (3) Remove the applicable compressor fairing (AMM 72-03-01/401).

      S 034-008-R00
      (4) Remove the bolts (6) that attach the tube (4).

      S 034-009-R00
      (5) Remove the bolts (2) and washers (3) that attach the valve (1).

      S 024-010-R00
      (6) Remove the valve (1).



IP Compressor Bleed Valve Installation
Figure 401

S 434-011-R00
(7) Install dust caps on all openings.

TASK 75-32-02-404-012-R00

3. Install the IP Compressor Bleed Valve

A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Valve Assy-IP Compressor Bleed	75-32-02	04	25
	2	Bolt			5
	3	Washer			10
					15
	4	HP(3) Air Tube	75-32-09	06	75
					85
					95
	6	Bolt			65

B. References
(1) AMM 72-03-01/401, Compressor Fairings
(2) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zones
411 Left Engine
421 Right Engine

(2) Access Panels
415AL Thrust Reverser, Left Engine
416AR Thrust Reverser, Left Engine
425AL Thrust Reverser, Right Engine
426AR Thrust Reverser, Right Engine

D. Procedure (Fig. 401)

S 034-014-R00
(1) Remove the dust caps from the valve (1) mount and air tube (4) adapter.

S 424-015-R00
(2) Align the valve (1) with the mounting holes in the outlet duct (5) and tube (4) adapter.

S 434-016-R00
(3) Install the bolts (2) and washers (3) that attach the bleed valve (1) to the outlet duct (5).

S 434-019-R00

(4) Install the bolts (6) that attach the air tube (4) adapter to the valve (1).

S 414-020-R00

(5) Install the applicable compressor fairing (AMM 72-03-01/401).

S 414-021-R00

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(6) Close the thrust reversers (AMM 78-31-00/201).

S 944-022-R00

(7) Remove the protective work mat from the fan case.

IP BLEED VALVE SOLENOIDS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains four tasks. The first task is to remove the left IP Bleed Valve Solenoid. The second task is to install the left IP Bleed Valve Solenoid. The third task is to remove the right IP Bleed Valve Solenoid. The fourth task is to install the right IP Bleed Valve Solenoid.

TASK 75-32-03-004-001-R00

2. Remove the Left IP Bleed Valve Solenoid (Fig. 401)
   A. References
      (1) AMM 72-03-01/401, Compressor Fairings
      (2) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          415AL Thrust Reverser, Left Engine
          416AR Thrust Reverser, Left Engine
          425AL Thrust Reverser, Right Engine
          426AR Thrust Reverser, Right Engine

   C. Prepare to Remove the IPBV Solenoid

      S 864-002-R00
      (1) For the left engine, open this circuit breaker and attach the DO-NOT-CLOSE tag:
          (a) P11-2 Overhead Circuit Breaker Panel
              1) 11D21, ENGINES HP BLD VLV LEFT

      S 864-003-R00
      (2) For the right engine, open this circuit breaker and attach the DO-NOT-CLOSE tag:
          (a) P11-2 Overhead Circuit Breaker Panel
              1) 11D22, ENGINES HP BLD VLV RIGHT

      S 014-004-R00

      WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

      (3) Open the thrust reversers (AMM 78-31-00/201).

S 014-005-R00
(4) Remove the top left and side left compressor fairings (AMM 72-03-01/401).

D. Procedure

S 034-006-R00
(1) Remove the electrical connector.

S 034-007-R00
(2) Remove the clips at points C, E, F, G and H (Fig. 401).

S 034-008-R00
(3) Disconnect the fitting at point J.

S 034-009-R00
(4) Remove the bolts (9) and disconnect the tubes (12 and 13).

S 034-010-R00
(5) Remove the tube fittings at the solenoid valve (7).

S 034-012-R00
(6) Remove the bolts (14).

S 024-013-R00
(7) Remove the solenoid valve (7).

S 434-014-R00
(8) Install dust caps to all openings and electrical connectors.

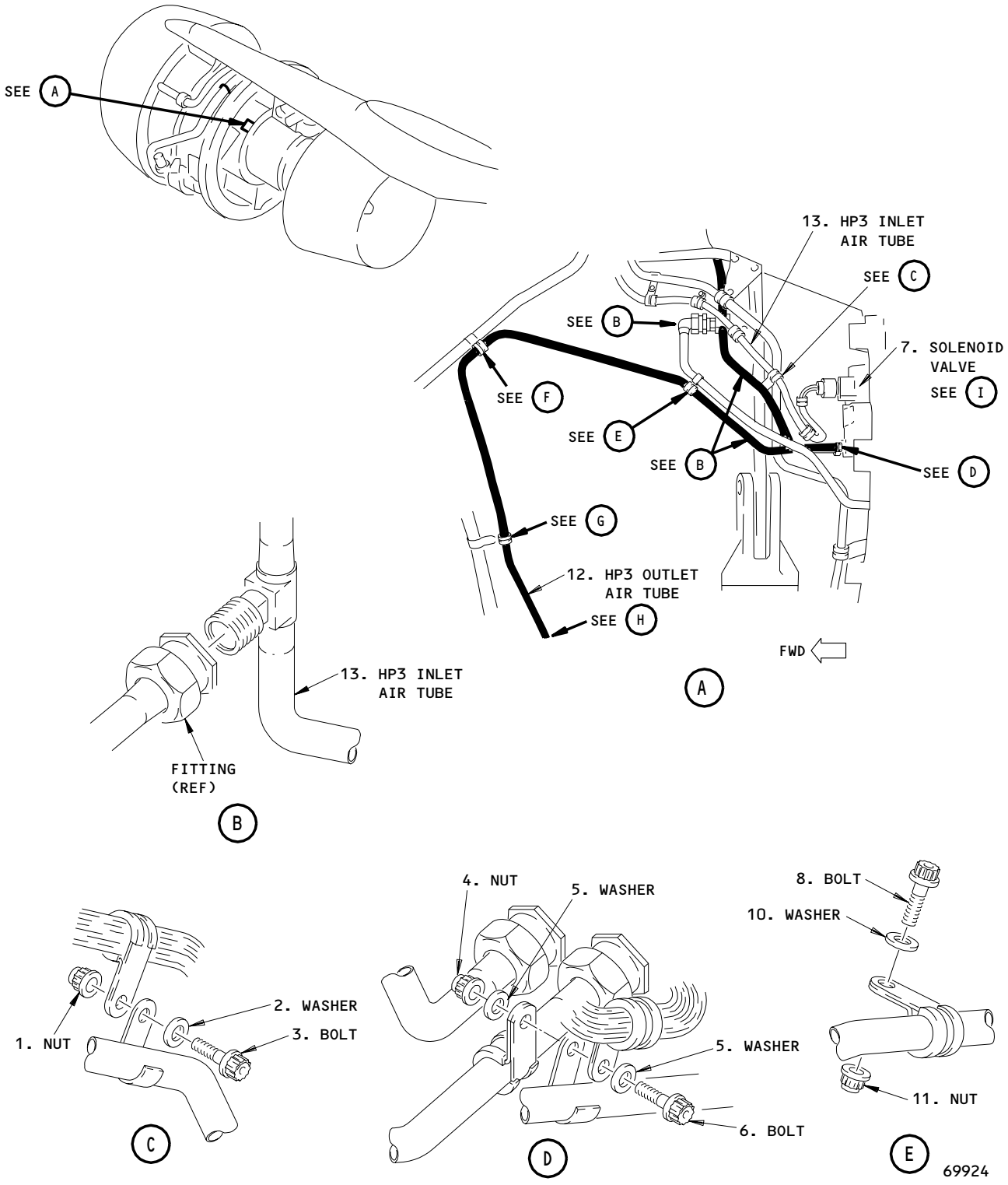
TASK 75-32-03-404-015-R00

3. Install the Left IP Bleed Valve Solenoid (Fig. 401)

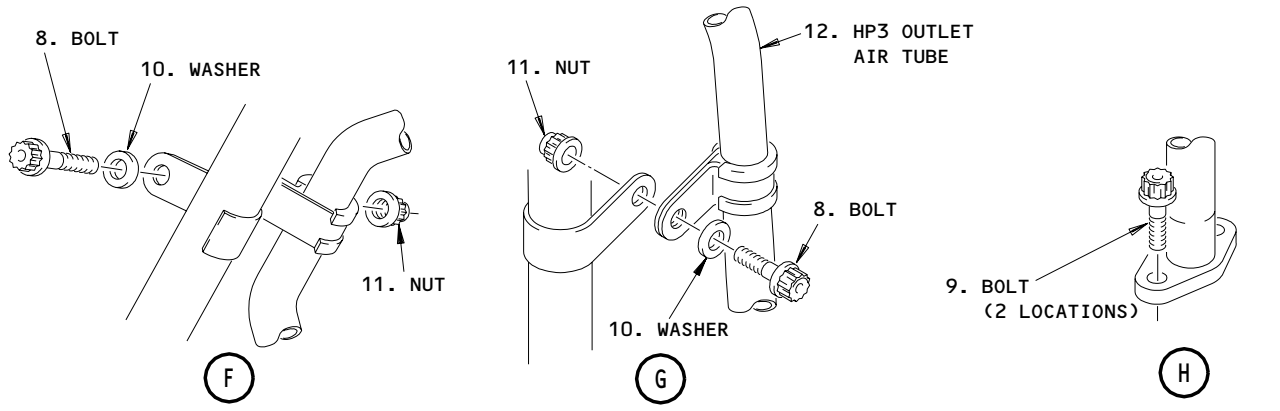
A. Consumable Materials

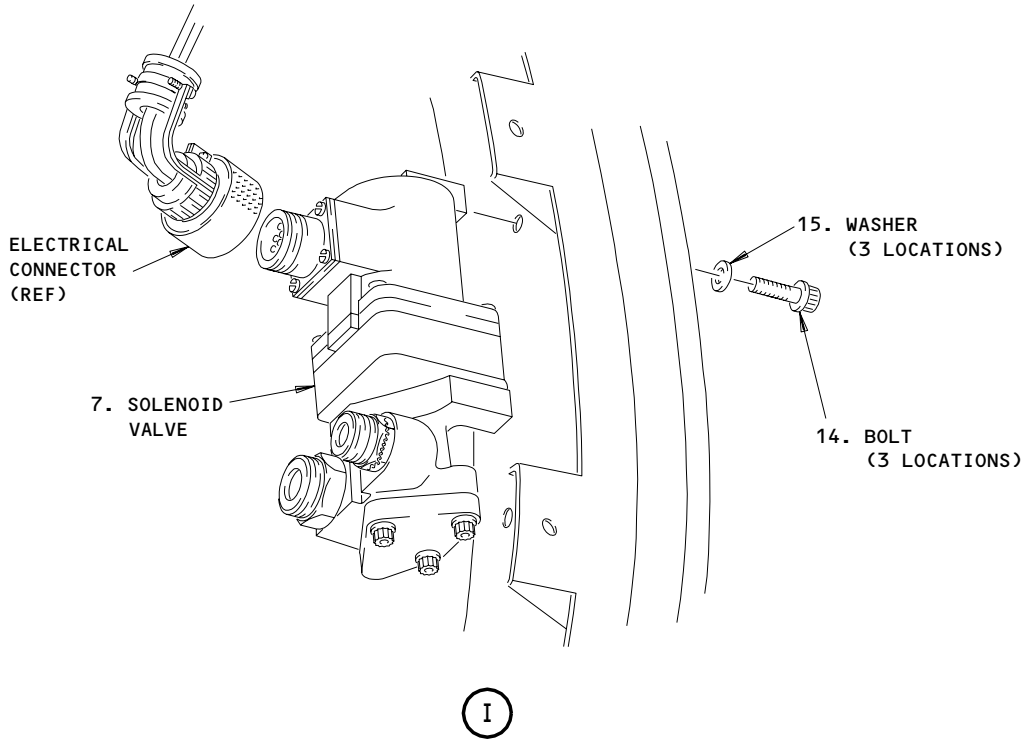
(1) Lockwire
British Spec/Ref - DTD 189A, 22 SWG
American Spec/Ref - 21 AWG
OMat No. 238

(2) Degreasing fluid (inhibited and stabilized 1.1.1.trichloroethane)
British Spec/Ref - B.S. 4487, 1969
American Spec/Ref - MIL-T-81533
OMat No. 1/21



Left IP Bleed Valve Solenoid Removal/Installation
Figure 401 (Sheet 1)





Left IP Bleed Valve Solenoid Removal/Installation
Figure 401 (Sheet 2)

B. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	1	Nut	75-32-09	06	40
	2	Washer			30
	3	Bolt			10
	4	Nut			42
	5	Washer			32
	6	Bolt			20
	7	Valve Assy - Solenoid IP Bleed Valve Op	75-32-03	01	10
	8	Bolt	75-32-09	06	12
	9	Bolt			65
	10	Washer			32
	11	Nut			42
	12	Tube Assy			95
	13	Tube Assy			90
	14	Bolt	75-32-03	01	20
	15	Washer			25
402	1	Bolt	75-32-09	06	20
	2	Washer			32
	3	Nut			42
	4	Washer			32
	5	Nut			42
	6	Bolt			65
	7	Washer			32
	8	Bolt			12
	9	Bolt			12
	10	Washer			32
	11	Tube Assy			95
	12	Tube Assy			90
	13	Valve Assy - Solenoid IP Bleed Valve Op	75-32-03	01	10
	14	Bolt			20
	15	Washer			25

C. References
(1) AMM 70-50-02/201, Connection of Electrical Plugs
(2) AMM 72-03-01/401, Compressor Fairing
(3) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

411 Left Engine
421 Right Engine

(2) Access Panels

415AL Thrust Reverser, Left Engine
416AR Thrust Reverser, Left Engine
425AL Thrust Reverser, Right Engine
426AR Thrust Reverser, Right Engine

E. Procedure

S 114-016-R00

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

(1) Put degreasing fluid on a clean, dry, lint-free cloth until it is moist.

NOTE: Put the degreasing fluid on the cloth away from the container to prevent contamination of the bulk liquid.

S 114-017-R00

(2) Remove the contamination from the mating surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 034-018-R00

(3) Remove the dust caps from all openings and electrical connectors.

S 424-019-R00
(4) Install the solenoid valve (7) with the bolts (14) and washers (15).

S 434-020-R00
(5) Install the tube fittings on the solenoid valve (7).

S 434-021-R00
(6) Connect the tubes (12 and 13) with the bolts (9).

S 434-024-R00
(7) Attach the fitting at point J.
(a) Safety the fitting with a lockwire.

S 434-025-R00
(8) Install the clips at points C, E, F, G and H (Fig. 401).

S 434-026-R00
(9) Install the electrical connector.

F. Put the Airplane Back to its Usual Condition

S 414-027-R00
(1) Install the compressor fairings (AMM 72-03-01/401).

S 414-028-R00

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Close the thrust reversers (AMM 78-31-00/201).

S 864-029-R00
(3) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D21, ENGINE HP BLD VLV LEFT

S 864-030-R00
(4) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D22, ENGINE HP BLD VLV RIGHT

S 724-031-R00
(5) Do the required tests for installation of the bleed solenoids (AMM 71-00-00/501).

TASK 75-32-03-004-032-R00

4. Remove the Right IP Bleed Valve Solenoid (Fig. 402)

A. References
(1) AMM 72-03-01/401, Compressor Fairing
(2) AMM 78-31-00/201, Thrust Reverser System

B. Access
(1) Location Zones
411 Left Engine
421 Right Engine

(2) Access Panels
415AL Thrust Reverser, Left Engine
416AR Thrust Reverser, Left Engine
425AL Thrust Reverser, Right Engine
426AR Thrust Reverser, Right Engine

C. Prepare to Remove the IPBV Solenoid

S 864-033-R00
(1) For the left engine, open this circuit breaker and attach the DO-NOT-CLOSE tag:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D21, ENGINE HP BLD VLV LEFT

S 864-034-R00
(2) For the right engine, open this circuit breaker and attach the DO-NOT-CLOSE tag:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D22, ENGINE HP BLD VLV RIGHT

S 014-035-R00

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Open the thrust reversers (AMM 78-31-00/201).

S 014-036-R00
(4) Remove the top right and side right compressor fairings (AMM 72-03-01/401).

D. Procedure

S 034-037-R00
(1) Remove the electrical connector.

S 034-038-R00
(2) Remove the clips at points D, E and F.

S 034-039-R00
(3) Disconnect the fitting at point B.

S 034-040-R00
(4) Remove the bolts (6).

S 034-041-R00
(5) Disconnect the tubes (11 and 12).

S 034-042-R00
(6) Remove the tube fittings at the solenoid valve (13).

S 034-043-R00
(7) Remove the bolts (14).

S 024-044-R00
(8) Remove the solenoid valve (13).

S 434-045-R00
(9) Install dust caps on all openings and electrical connectors.

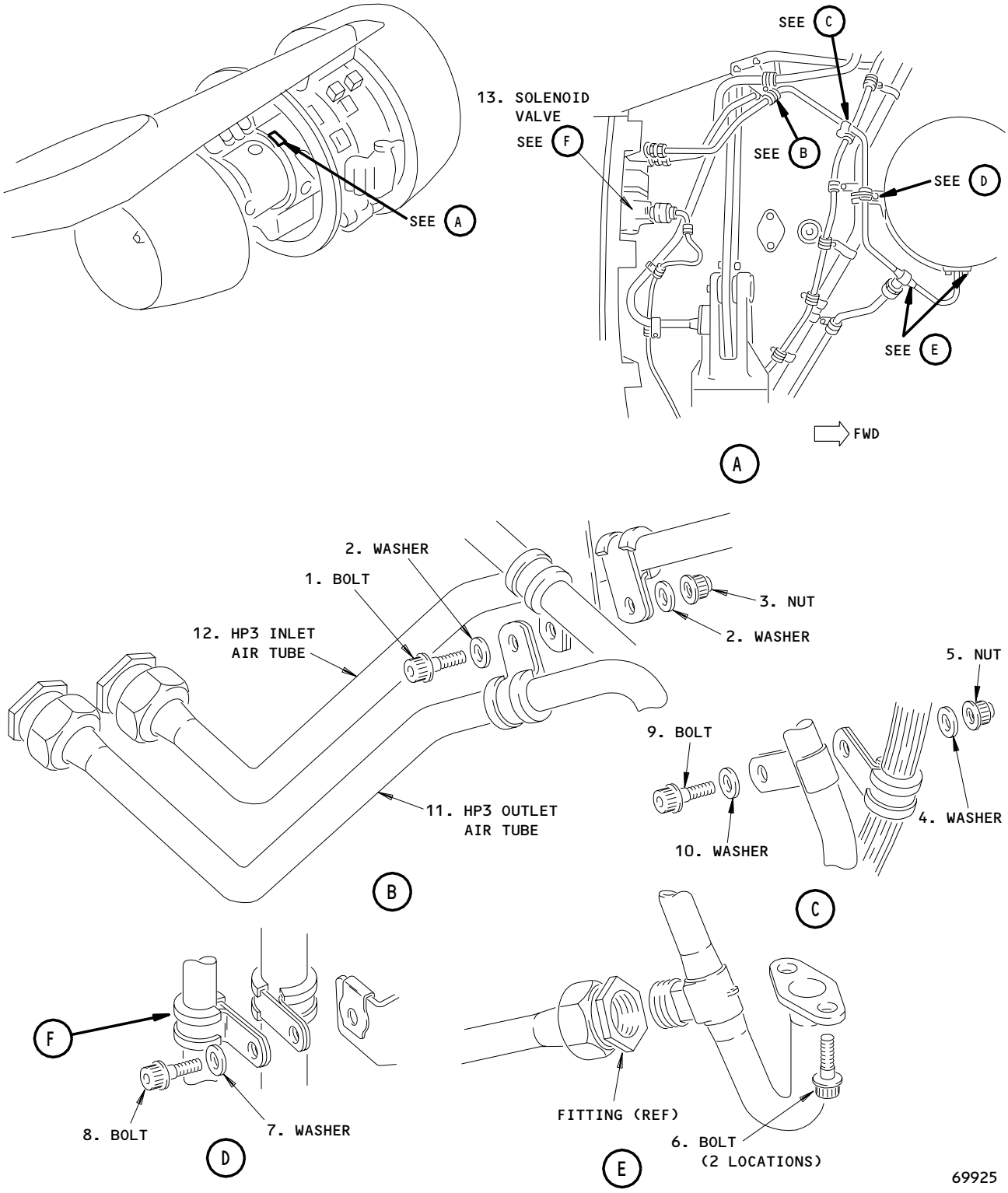
TASK 75-32-03-404-046-R00

5. Install the Right IP Bleed Valve Solenoid (Fig. 402)

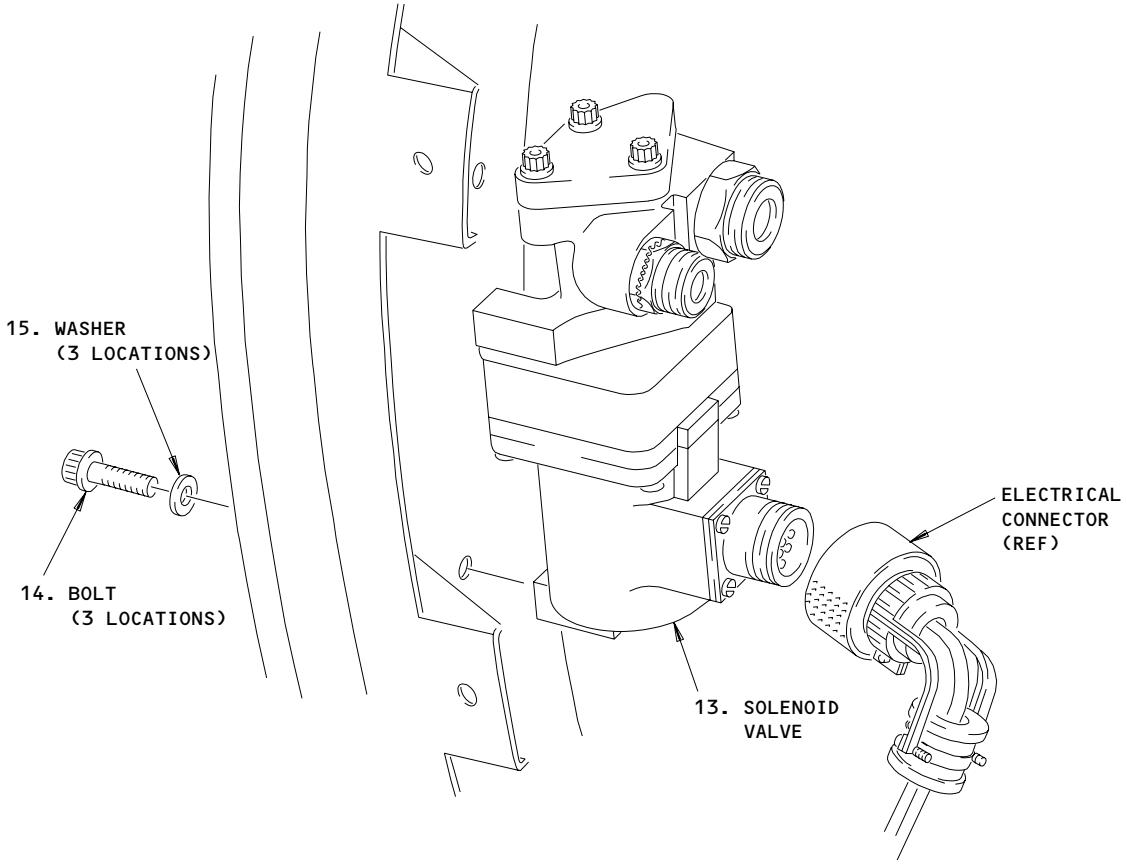
A. Consumable Materials

(1) Lockwire
British Spec/Ref - DTD 189A, 22 SWG
American Spec/Ref - 21 AWG
OMat No. 238

(2) Degreasing fluid (inhibited and stabilized 1.1.1.trichloroethane)
British Spec/Ref - B.S. 4487, 1969
American Spec/Ref - MIL-T-81533
OMat No. 1/21



Right IP Bleed Valve Solenoid Removal/Installation
Figure 402 (Sheet 1)



Right IP Bleed Valve Solenoid Removal/Installation
Figure 402 (Sheet 2)

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Nut	75-32-09	06	40
	2	Washer			30
	3	Bolt			10
	4	Nut			42
	5	Washer			32
	6	Bolt			20
	7	Valve Assy - Solenoid IP Bleed Valve Op	75-32-03	01	10
	8	Bolt	75-32-09	06	12
	9	Bolt			65
	10	Washer			32
	11	Nut			42
	12	Tube Assy			95
	13	Tube Assy			90
	14	Bolt	75-32-03	01	20
	15	Washer			25
402	1	Bolt	75-32-09	06	20
	2	Washer			32
	3	Nut			42
	4	Washer			32
	5	Nut			42
	6	Bolt			65
	7	Washer			32
	8	Bolt			12
	9	Bolt			12
	10	Washer			32
	11	Tube Assy			95
	12	Tube Assy			90
	13	Valve Assy - Solenoid IP Bleed Valve Op	75-32-03	01	10
	14	Bolt			20
	15	Washer			25

C. References
(1) AMM 70-50-02/201, Connection of Electrical Plugs
(2) AMM 72-03-01/401, Compressor Fairing
(3) AMM 78-31-00/201, Thrust Reverser System

D. Access

(1) Location Zones

411 Left Engine
421 Right Engine

(2) Access Panels

415AL Thrust Reverser, Left Engine
416AR Thrust Reverser, Left Engine
425AL Thrust Reverser, Right Engine
426AR Thrust Reverser, Right Engine

E. Procedure

S 114-047-R00

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

(1) Put degreasing fluid on a clean, dry, lint-free cloth until it is moist.

NOTE: Put the degreasing fluid on the cloth away from the container to prevent contamination of the bulk liquid.

S 114-048-R00

(2) Remove the contamination from the mating surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 034-049-R00

(3) Remove the dust caps from all openings and electrical connectors.

S 424-050-R00
(4) Install the solenoid valve (13) with the bolts (14) and washers (15).

S 434-051-R00
(5) Install the tube fittings at the solenoid valve (13).

S 434-052-R00
(6) Connect the tubes (11 and 12) with the bolts (6).

S 434-053-R00
(7) Attach the fitting at point B.

S 434-054-R00
(8) Safety the fitting with a lockwire.

S 434-055-R00
(9) Install the clips at points D, E and F (Fig. 402).

S 434-056-R00
(10) Install the electrical connector.

F. Put the Airplane Back to its Usual Condition

S 414-057-R00
(1) Install the compressor fairings (AMM 72-03-01/401).

S 414-058-R00

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Close the thrust reversers (AMM 78-31-00/201).

S 864-059-R00
(3) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D21, ENGINES HP BLD VLV LEFT

S 864-060-R00
(4) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D22, ENGINES HP BLD VLV RIGHT

S 724-061-R00

(5) Do the required tests for installation of the bleed solenoids (AMM 71-00-00/501).

HIGH PRESSURE (HP) COMPRESSOR BLEED VALVES AND CASE ASSEMBLY - REMOVAL/INSTALLATION

1. General
   A. This procedure contains four tasks. The first task is to remove the HP Compressor Bleed Valves and Case Assembly. The second task is to disassemble the HP(3) Bleed Valve Case Assembly. The third task is to assemble the HP(3) Bleed Valve Case Assembly. The fourth task is to install the HP Compressor Bleed Valve and Case Assembly.
   B. This procedure applies to the left and right bleed valves.
   C. Use the procedures given in 70-51-00/201 to tighten fasteners. Tighten the fasteners to the torque values given in 70-51-00/201 unless a torque value is specified in this procedure.

TASK 75-32-04-004-001-R00

2. Remove the HP Compressor Bleed Valves and Case Assembly
   A. References
      (1) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panel
          416AR Thrust Reverser (L Engine)
          426AR Thrust Reverser (R Engine)

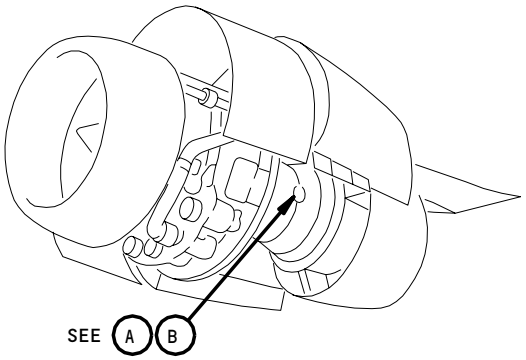
   C. Procedure

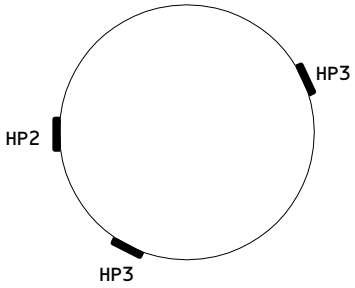
      S 014-002-R00

      WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

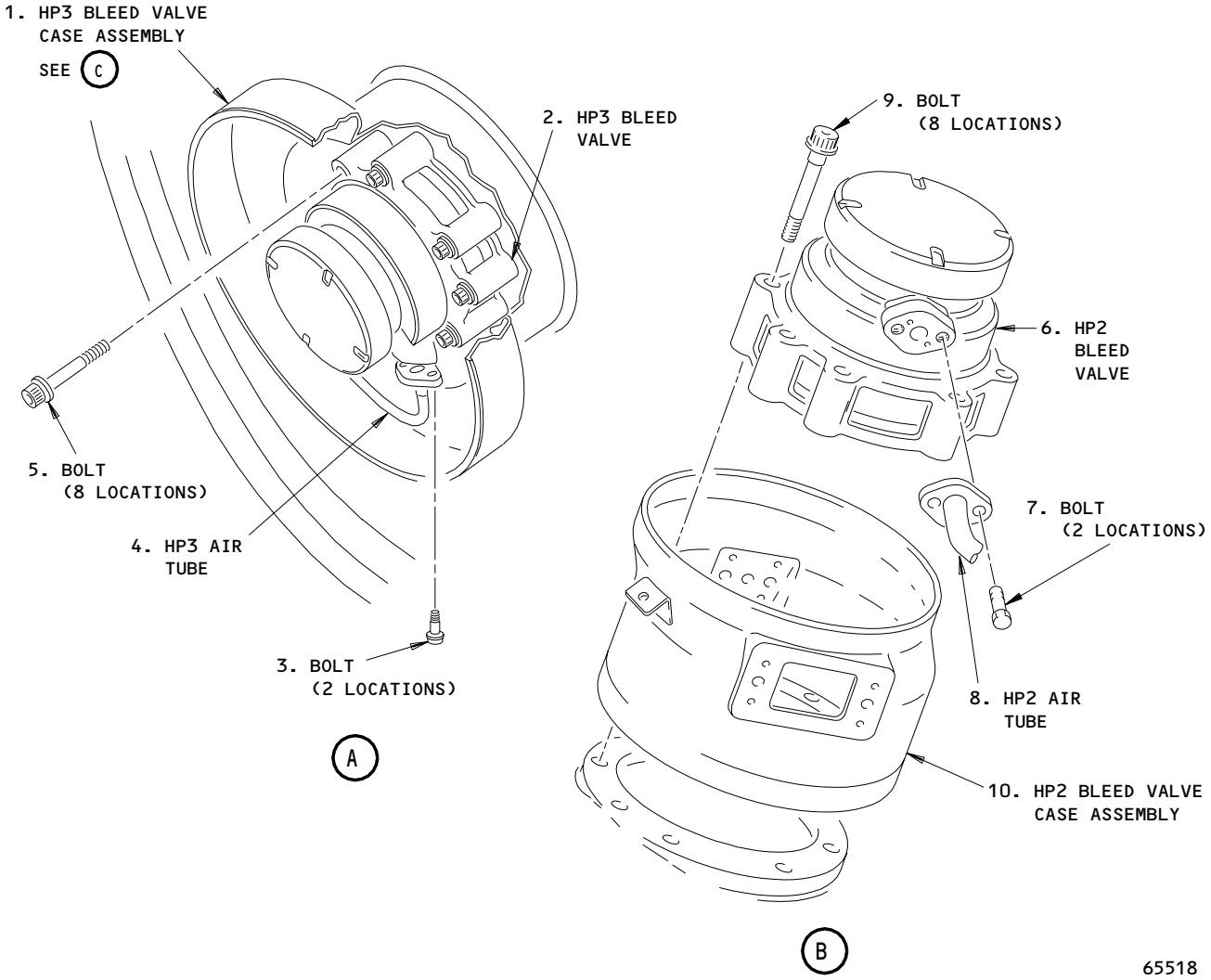
      (1) Open the left thrust reverser (AMM 78-31-00/201).

      S 024-003-R00
      (2) Remove the HP(2) bleed valve as follows (Fig. 401):
          (a) Remove the bolts (7) that attach the air tube (8).
          (b) Remove the bolts (9) that attach the bleed valve and duct assembly to the compressor case.
          (c) Move the bleed valve (6) to release the baulking pin that attaches the valve to the tube (8) adapter.
          (d) Remove the bleed valve.
          (e) Remove the HP(2) bleed valve duct assembly (10).

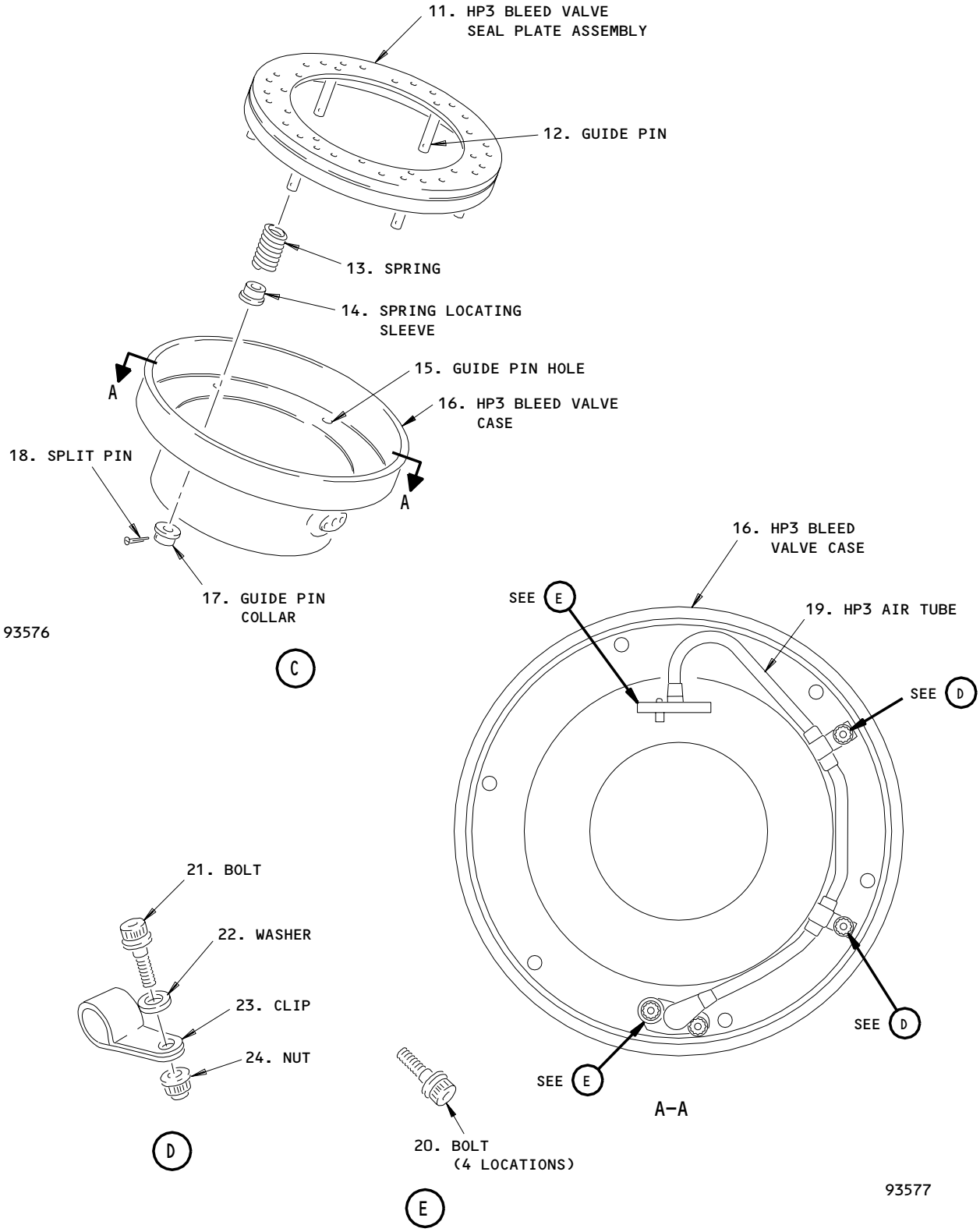




HP BLEED VALVE LOCATION
(VIEW IN THE FORWARD DIRECTION)



HP Bleed Valve and Case Assembly
Figure 401 (Sheet 1)



HP(3) Bleed Valve and Case Assembly
Figure 401 (Sheet 2)

(f) Install dust caps on all openings and connectors.

S 024-004-R00

(3) Remove the HP(3) bleed valve as follows:
(a) Remove the bolts (3) that attach the air tube (4).
(b) Remove the bolts (5) that attach the bleed valve and case assembly to the compressor case.
(c) Move the bleed valve (2) to release the baulking pin that attaches the valve to tube (4) adapter.
(d) Remove the bleed valve.
(e) Remove the HP(3) bleed valve case assembly (1).
(f) Move the HP(3) bleed valve case assembly (1) to a work bench.
(g) Install dust caps to all openings and connectors.

TASK 75-32-04-034-005-R00

3. Disassemble the HP(3) Bleed Valve Case Assembly

A. Procedure (Fig. 401)

S 034-006-R00

(1) Remove the split pins (18) from the guide pin collars (17).

S 034-007-R00

(2) Slowly release the seal plate assembly (11) until the springs (13) are fully extended.

S 034-008-R00

(3) Remove the springs (13) and the spring locating sleeves (14) from the seal plate assembly (11).

S 024-009-R00

(4) Remove the HP(3) internal air tube (19) as follows:
(a) Remove the bolts (20) and (21) that attach the internal air tube (19) to the bleed valve case (16).
(b) Remove the internal air tube (19).
(c) Install a cap on the ends of the internal air tube (19).
(d) Keep the internal air tube (19) for assembly.

TASK 75-32-04-434-010-R00

4. Assemble the HP(3) Bleed Valve Case Assembly

A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
401	11	HP(3) Bleed Valve Seal Plate Assy	75-32-04	01	30
	12	HP(3) Air Tube			52
	13	Spring			50
	14	Spring Locating Sleeve			45
	16	HP(3) Bleed Valve Case			30
	17	Guide Pin Collar			40
	18	Pin			35
	19	HP(3) Air Tube			105
	20	Bolt			12
	21	Bolt			85
	22	Washer			90
	23	Clip			100
	24	Nut			95

B. Procedure (Fig. 401)

S 424-011-R00

(1) Install the HP(3) internal air tube (1) as follows:
  (a) Remove the caps from the internal air tube (19).
  (b) Install the clip (23) to the internal air tube (19).
  (c) Attach the internal air tube (19) to the bleed valve case with the washers (22), bolts (20) and (21) and nuts (24).

S 944-012-R00

(2) Put the seal plate assembly (11) on a work bench with the guide pins (12) pointed up.

S 434-013-R00

(3) Install the springs (13) on the guide pins (12).

S 434-014-R00
(4) Install the spring locating sleeves (14) on the guide pins (12) after the springs.

S 434-015-R00
(5) Turn the bleed valve case (16) to its opposite side and install it on the guide pins (12).

NOTE: Align the guide pins (12) with the guide pin holes (15).

S 434-016-R00
(6) Push against the bleed valve case until the guide pins (12) come through the guide pin holes (15).

S 434-017-R00
(7) Install the guide pin collars (17) on the guide pins (12) with a collar flange.

S 434-018-R00
(8) Attach the guide pin collar with the split pins (18).

TASK 75-32-04-404-019-R00

5. Install the HP Compressor Bleed Valve and Case Assembly

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	HP(3) Bleed Valve Case Assy	75-32-04	01	30
	2	HP(3) Bleed Valve Assy			15J
	3	Bolt			12
	4	HP(3) Air Tube			105
	5	Bolt			20
	6	HP(2) Bleed Valve Assy			65
	7	Bolt	75-32-09	04	35
	8	HP(2) Air Tube			230J
	9	Bolt	75-32-04	03	70
	10	HP(2) Bleed Valve Duct Assy			75

B. References
(1) AMM 78-31-00/201, Thrust Reverser System

C. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panel
416AR Thrust Reverser (L Engine)
426AR Thrust Reverser (R Engine)

D. Procedure (Fig. 401)

S 034-020-R00
(1) Remove the covers from the openings and connectors.

S 424-021-R00
(2) Install the HP(2) bleed valve as follows:
(a) Install the bleed valve duct assembly (10) on the compressor case.
(b) Align the bleed valve (6) with the tube (8) adapter.
1) Make sure the baulking pin is fully in.
(c) Install the bolts (9) that attach the valve (6) and duct assembly (10) to the compressor case.
(d) Install the bolts (7) that attach the air tube (8) to the bleed valve (6).

S 424-022-R00
(3) Install the HP(3) bleed valve as follows:
(a) Install the bleed valve case assembly (1) on the compressor case.
(b) Align the bleed valve (2) with the tube (4) adapter.
(c) Make sure the baulking pin is fully in.
(d) Install the bolts (5) that attach the valve (2) and case assembly (1) to the compressor case.
(e) Install the bolts (3) that attach the air tube (4) to the bleed valve (1).

S 414-023-R00

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURIES TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(4) Close the left thrust reverser (AMM 78-31-00/201).

HIGH PRESSURE COMPRESSOR BLEED VALVE AND CASE ASSEMBLY - INSPECTION/CHECK

1. General
   A. This procedure contains the data to examine the guide pins and the guide pin holes of the high pressure compressor bleed valve and case assembly (referred to as the HPC bleed valve and case assembly).
   B. There are two different HPC bleed valve and case assemblies.
   C. One of the HPC bleed valve and case assemblies is referred to as the HP2 bleed valve and case assemlby.
   D. The other one is referred to as the HP3 bleed valve and case assembly.

TASK 75-32-04-216-001-R00

2. Examine the High Pressure Compressor Bleed Valve and Case Assembly
   A. References
      (1) AMM 75-32-04/401, HP Compressor Bleed Valves and Case Assembly
      (2) AMM 75-32-04/801, HP Compressor Bleed Valves and Case Assembly
      (3) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          415AL Thrust Reverser (Left)
          416AR Thrust Reverser, (Left)
          425AL Thrust Reverser, (Right)
          426AR Thrust Reverser, (Right)

   C. Prepare to Examine the HP Bleed Valve and Case Assembly

      S 016-009-R00

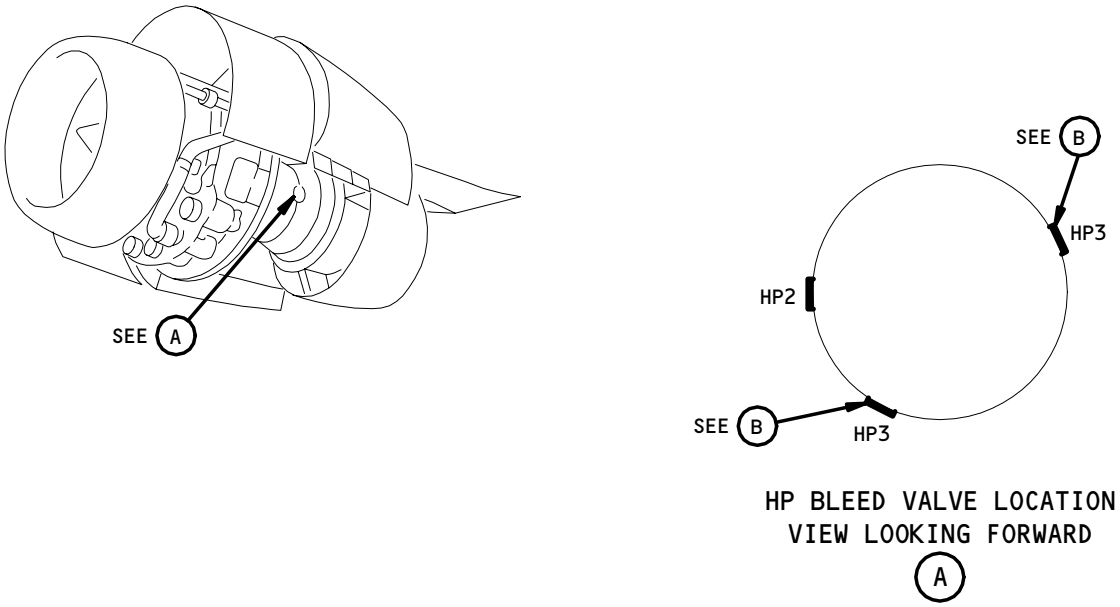
      WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

      (1) Open the thrust reversers (AMM 78-31-00/201).

      S 016-002-R00
      (2) Remove the HP3 bleed valve and case assembly (AMM 75-32-04/401).
   D. Examine the HP Bleed Valve and Case Assembly (Fig. 601)

      S 226-008-R00
      (1) Push down on the seal plate until the maximum length of the guide pins shows.

      S 226-004-R00
      (2) If a guide pin is worn more than 50 percent of the total diameter, repair the guide pin (AMM 75-32-04/801).



93576

HP Bleed Valve and Case Assembly Inspection
Figure 601

S 226-003-R00

(3) Examine the holes for the guide pins.

S 226-007-R00

(4) If a hole has increased in diameter more than 50 percent, repair the hole (AMM 75-32-04/801).

E. Put the Airplane Back to Its Usual Condition

S 416-005-R00

(1) Install the HP3 bleed valve and case assembly (AMM 75-32-04/401).

S 416-010-R00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Close the thrust reversers (AMM 78-31-00/201).

HIGH PRESSURE (HP) COMPRESSOR BLEED VALVES AND CASE ASSEMBLY - APPROVED REPAIRS

1. General
   A. This procedure contains repairs for the HP (3) bleed valve case assembly.
   B. These repairs include the replacement of worn guide pins in the bleed valve seal plate and the repair of the damaged guide pin holes in the bleed valve case with welding techniques.

TASK 75-32-04-008-001-R00

2. Replace the HP (3) Bleed Valve Seal Plate Assembly Guide Pins
   A. Equipment
      (1) Power drill with .016 inch (4 mm) Dia Drill Bit
      (2) Pneumatic Rivet gun
      (3) Rivet Sets
      (4) Bucking Bar
   B. Parts
      (1) Guide Pin, UP 10630
      (2) Rivets, AS 16448 or
      (3) Rivets, AN124972
   C. References
      (1) AMM 75-32-04/401 H. P. Bleed Valve and Case Assembly
      (2) AMM 78-31-00/201, Thrust Reverser System
   D. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          415AL Thrust Reverser (Left)
          416AR Thrust Reverser, (Left)
          425AL Thrust Reverser, (Right)
          426AR Thrust Reverser, (Right)

   E. Prepare the HP(3) Bleed Valve Case Assembly for the Repairs (Fig. 801)

This procedure is applicable to the HR (3) bleed valve case assembly with the part number that follows:

UL17952

S 018-029-R00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(1) Open the thrust reversers (AMM 78-31-00/201).

S 028-002-R00

(2) Remove, disassemble and examine the bleed valve case assembly (AMM 75-32-04/401).

S 328-003-R00

(3) Drill through the rivet tails to remove the defective guide pins.

S 328-028-R00

(4) To remove the remaining part of the rivets, lightly hit them with a hammer and metal chisel.

S 328-023-R00

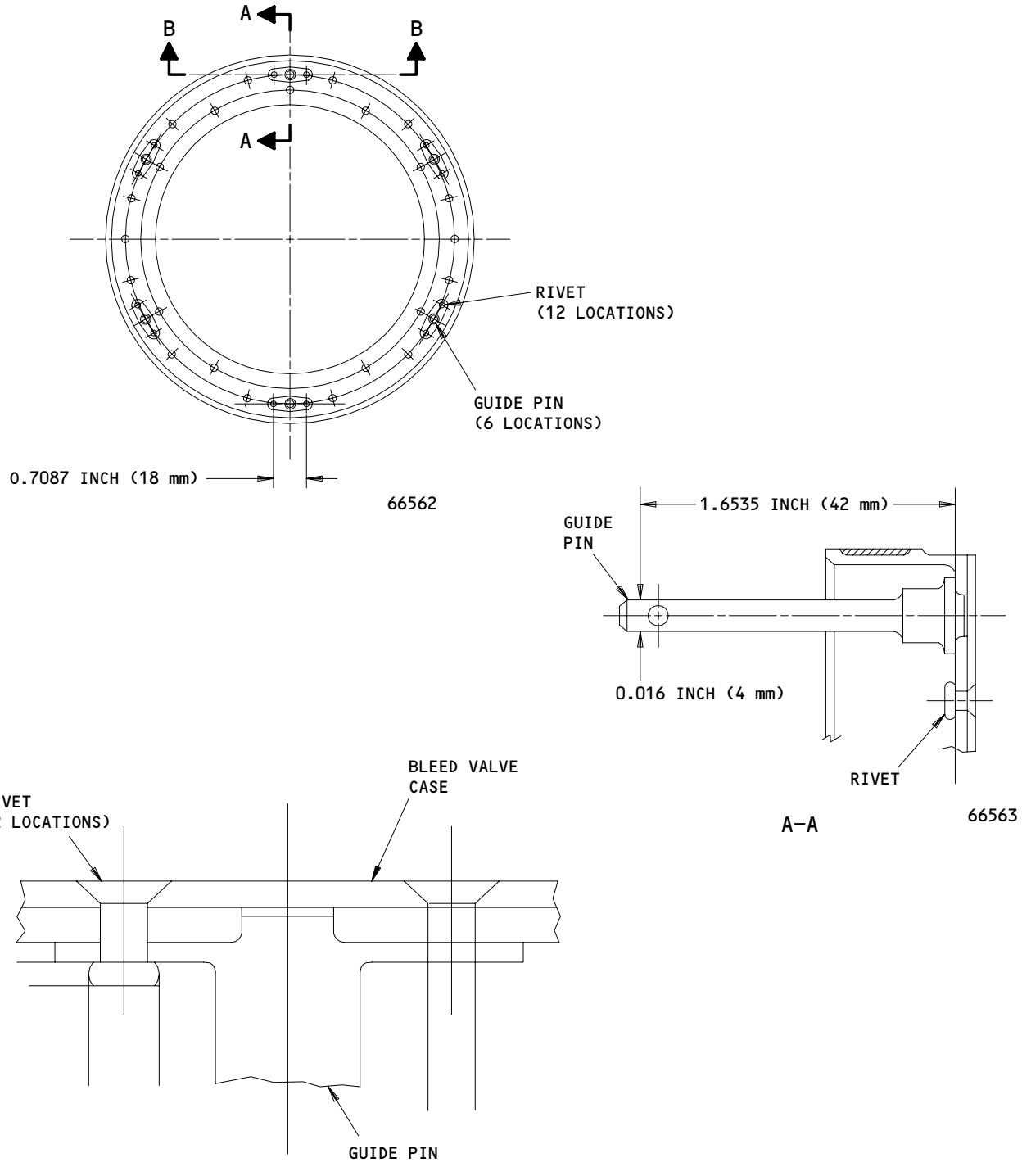
(5) Attach the replacement guide pins in the correct position in the seal plate with clamps.

S 328-024-R00

(6) Use the holes in the case to drill rivet holes in the guide pins.

S 328-025-R00

(7) Remove the guide pins from the seal plate and make the rivet holes smooth.



HP(3) Bleed Valve Case Guide Pin Replacement
Figure 801

S 328-026-R00

(8) Install the guide pins in the seal plate with a rivet gun and a bucking bar.

S 218-027-R00

(9) Visually examine the repair for a satisfactory assembly and installation.

S 938-028-R00

(10) Make a mark of FRS.5265 adjacent to the part number on the bleed valve case assembly to identify the repair.

NOTE: If you are done with the repairs put the airplane back to its usual condition.

F. Put the Airplane Back to its Usual Condition

S 428-031-R00

(1) Assemble the HP(3) bleed valve case assembly (AMM 75-32-04/401).

S 418-030-R00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Close the thrust reversers (AMM 78-31-00/201).

TASK 75-32-04-318-004-R00

3. Repair the HP (3) Bleed Valve Case Guide Pin Holes

A. Equipment
(1) Dry abrasive blasting equipment
(2) Paint brush, new, .5 inch (12.7 mm)
(3) Argon arc welding equipment
(4) Boring machine or drill jig

B. Consumable Materials
(1) B50009 - Acetone, OMat No. a50
(2) B50018 - Isopropyl alcohol, OMat No. 1/40
(3) B00713 - Degreaser, OMat No. 1/257
(4) Aluminum oxide abrasive 120-220 grade
OMat No. 146
(5) Welding filler wire, 18/8 stainless
British Spec/Ref - E.S.2901, 1970
OMat No. 306
(6) Lint free cloth

C. References
(1) AMM 75-32-04/401 HP Bleed Valve and Case Assembly
(2) AMM 78-31-00/201, Thrust Reverser System

D. Access
(1) Location Zones
411 Left Engine
421 Right Engine

(2) Access Panels
415AL Thrust Reverser (Left)
416AR Thrust Reverser, (Left)
425AL Thrust Reverser, (Right)
426AR Thrust Reverser, (Right)

E. Procedure (Fig. 802)
This procedure is applicable to the HR (3) bleed valve case assembly with the part number that follows:

UL17952

S 018-035-R00
(1) Open the thrust reversers (AMM 78-31-00/201).

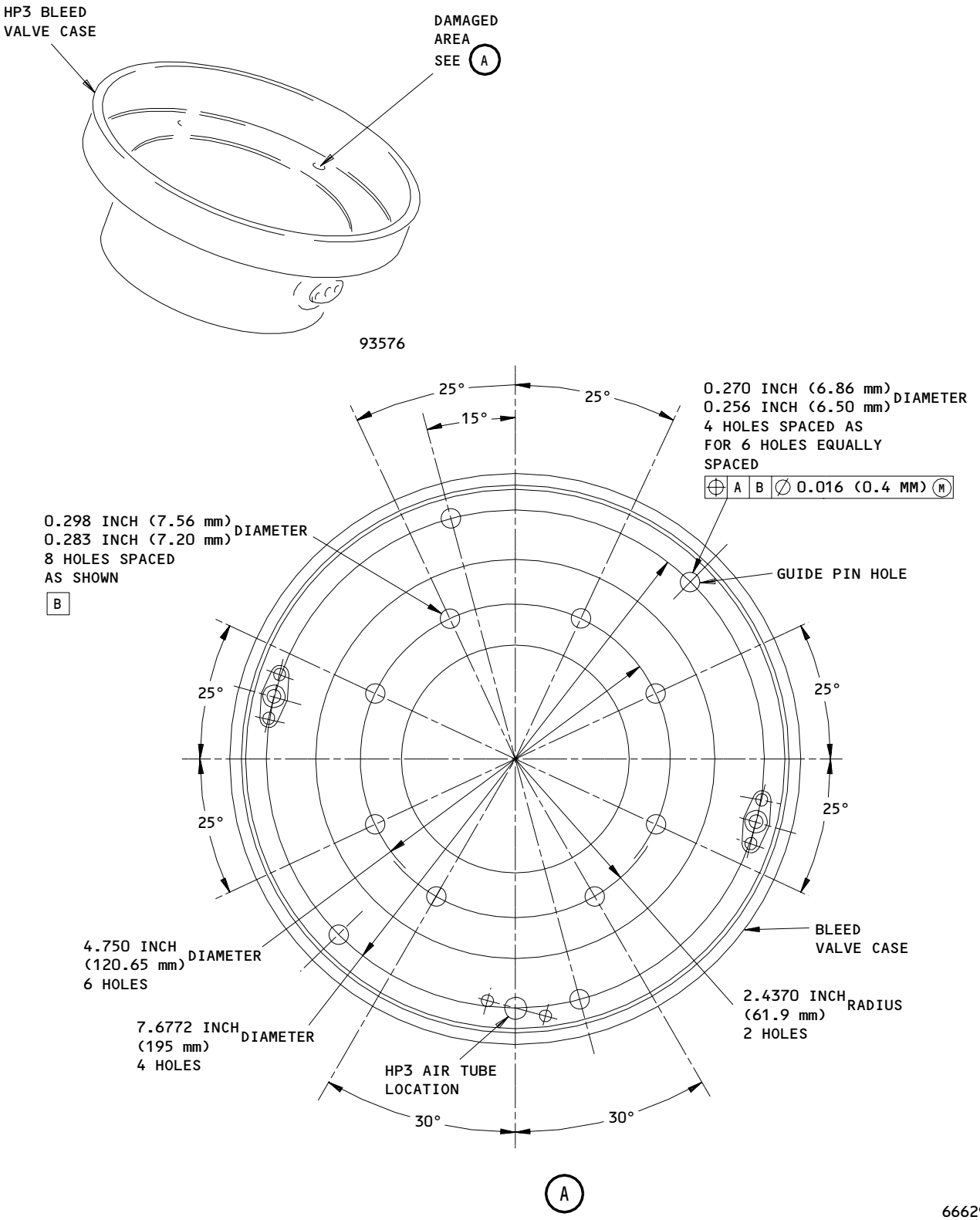
S 118-022-R00

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES AND GLOVES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID AS SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

(2) Make a clean, dry, lint-free cloth moist with degreasing fluid (Acetone, OMat No. 150 or Isopropyl Alcohol, OMat No. 1/40 or Degreaser, OMat No. 1/257).

NOTE: Put the degreasing fluid on the cloth away from the container to prevent contamination of the bulk liquid.



HP(3) Bleed Valve Guide Pin Hole Repair
Figure 802

S 118-006-R00
(3) Remove the contamination from the mating surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 438-007-R00
(4) Install a plug in all openings on the bleed valve case that must not be blasted.

S 128-008-R00
(5) Put the bleed valve case in the blasting cabinet or hold it in your hand with a glove.

S 128-009-R00
(6) Dry blast the bleed valve case with an aluminum oxide abrasive.

S 128-020-R00

CAUTION: THE AIR PRESSURE MUST NOT BE MORE THAN 40 PSI (275 kPa). IF THE AIR PRESSURE IS MORE THAN 40 PSI (275 kPa), DAMAGE TO THE HP(3) BLEED VALVE CASE CAN OCCUR.

(7) Apply the blast systematically to the surface of the case at an air pressure of 20-40 psi (140-275 kPa).

S 168-011-R00
(8) Remove the remaining abrasive grit with a brush.

S 118-012-R00
(9) Clean the bleed valve case with the degreasing fluid and let it dry.

S 318-013-R00
(10) Hold the case with a clamp while you do the welding.

S 318-014-R00

WARNING: MOVE THE BLEED VALVE CASE TO THE MAINTENANCE SHOP AREA, AWAY FROM THE AIRPLANE, FOR WELDING. IF YOU DO THE WELDING IN THE AREA NEAR THE AIRPLANE, INJURIES TO PERSONS AND DAMAGE TO THE AIRPLANE CAN OCCUR.

(11) Fill the damaged guide pin holes with the filler rod and welding equipment.

S 328-015-R00
(12) Make the guide pin holes that you filled smooth.

S 328-016-R00
(13) Bore or drill the holes with a boring machine or drill jig to the tolerances shown (Fig. 802).

S 218-017-R00
(14) Visually examine the dimensions of the guide pin holes in the bleed valve case.

S 938-018-R00
(15) Make a mark of FRS.5273 adjacent to the part number on the bleed valve case assembly to identify the repair.

F. Put the Airplane Back to its Usual Condition

S 428-019-R00
(1) Assemble the HP(3) bleed valve case assembly (AMM 75-32-04/401).

S 418-033-R00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Close the thrust reversers (AMM 78-31-00/201).

HP BLEED VALVE SOLENOIDS - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the data to remove and install the HP Bleed Valve Solenoids referred to as the solenoids.
   B. Use the procedures in AMM 70-51-00/201 to tighten the fasteners.
      (1) Tighten the fasteners to the torque values in AMM 70-51-00/201 unless a torque value is specified in this procedure.
   C. The procedure that follows is applicable to the HP2 and the HP3 Bleed Valve Solenoid.

TASK 75-32-05-004-001-R00

2. Remove the HP Bleed Valve Solenoids
   A. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
      (2) AMM 80-11-02/401, Starter Control Valve
   B. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          413AL Fan Cowl Panel, Left Engine
          423AL Fan Cowl Panel, Right Engine

   C. Prepare to Remove the Solenoids

      S 014-002-R00

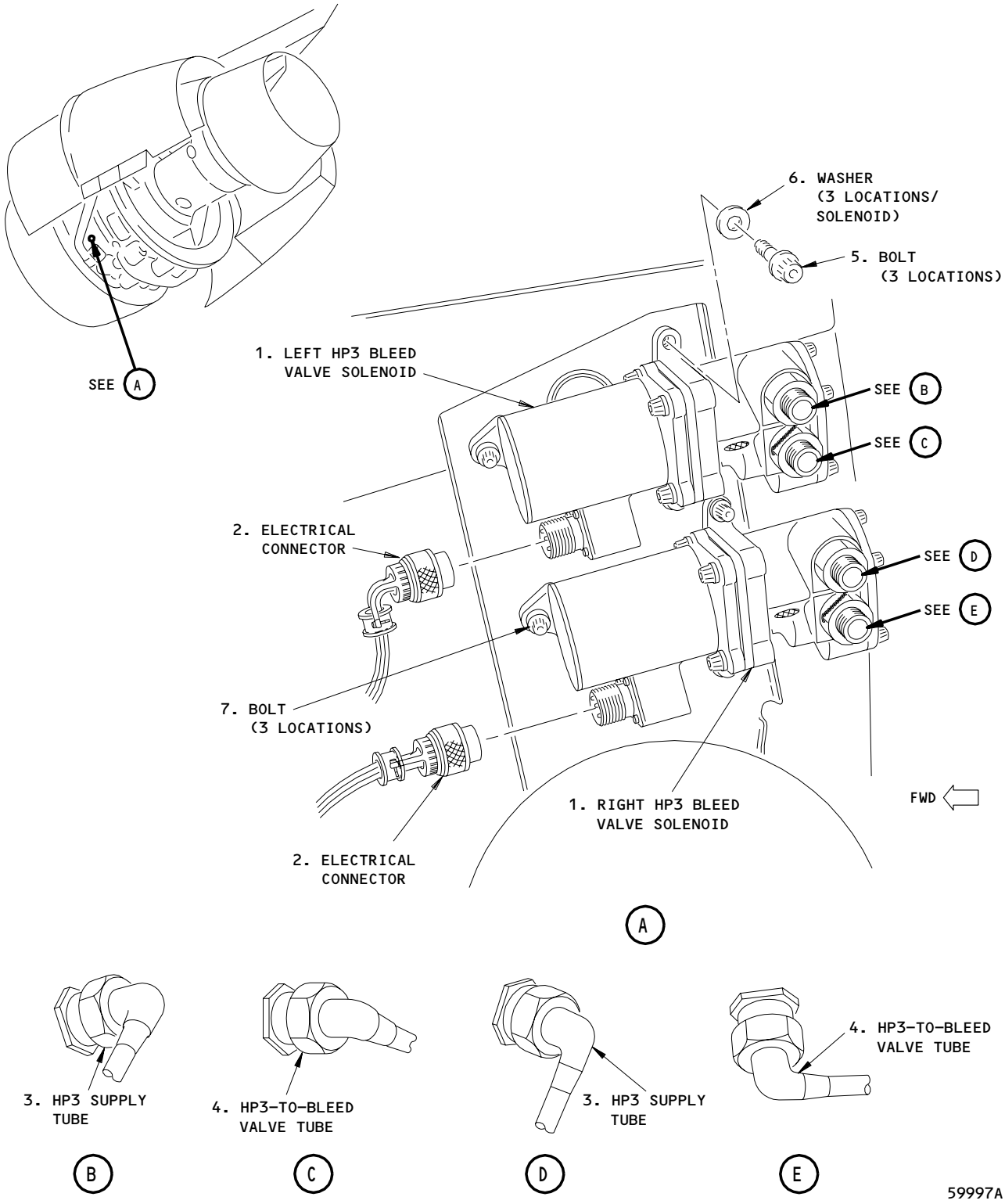
      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

      (1) Open the left fan cowl panel (AMM 71-11-04/201).

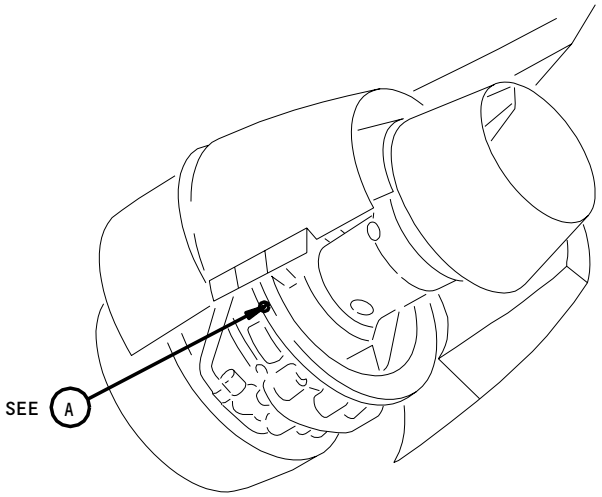
      S 014-003-R00
      (2) Remove the starter control valve (AMM 80-11-02/401) if the HP3 solenoid is to be removed.
   D. Remove the Solenoid (Fig. 401, Fig. 402)

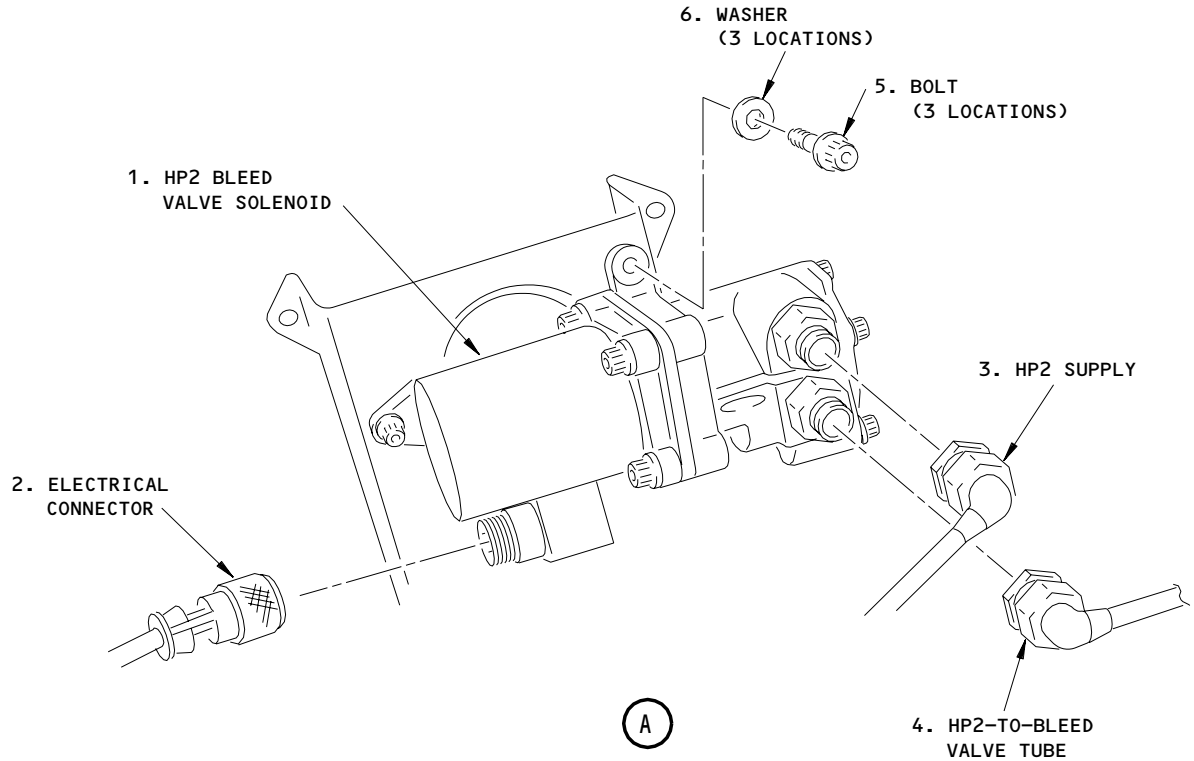
      NOTE: Fig. 401 for the HP3 Solenoid. Fig. 402 for the HP2 Solenoid.

      S 034-004-R00
      (1) Disconnect the electrical connector (2) from the solenoid (1).



HP3 Bleed Valve Solenoid Installation
Figure 401





HP2 Bleed Valve Solenoid Installation
Figure 402

S 034-005-R00
(2) Disconnect the supply tube (3) and the bleed tube (4) from the solenoid.

S 024-006-R00
(3) Remove the mounting bolts (5) and the washers (6), and remove the solenoid (1).

S 034-007-R00
(4) Install protection caps on all openings and the electrical connector.

TASK 75-32-05-404-008-R00

3. Install the HP Bleed Valve Solenoids

A. Parts

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
402	1	Bleed Valve Solenoid, Left HP3	75-32-05	01	5
		Bleed Valve Solenoid, Right HP3		02	
	5	Bolt		01	13
	6	Washer			15
	7	Bolt		02	10

AMM			AIPC		
FIG	ITEM	NOMENCLATURE	SUBJECT	FIG	ITEM
402	1	Bleed Valve Solenoid, HP2	75-32-05	05	5
	5	Bolt			10
	6	Washer			15

B. References
(1) AMM 71-11-04/201, Fan Cowl Panels
(2) AMM 80-11-02/401, Starter Control Valve

C. Access
(1) Location Zones
411 Left Engine
421 Right Engine

(2) Access Panels
413AL Fan Cowl Panel, Left Engine
423AL Fan Cowl Panel, Right Engine

D. Install the Solenoid (Fig. 401, Fig. 402)

NOTE: Fig. 401 for the HP3 solenoid. Fig. 402 for the HP2 solenoid.

S 434-009-R00
(1) Remove the protection caps from all openings and the electrical connector.

S 424-010-R00
(2) Install the solenoid (1) with the mounting bolts (5) and the washers (6).

S 424-011-R00
(3) Tighten the mounting bolts (5).

S 434-012-R00
(4) Connect the supply tube (3) and the bleed tube (4) to the solenoid (1).

S 434-013-R00
(5) Tighten the tubes nuts.

S 434-014-R00
(6) Install the lockwire on the tube nuts.

S 434-015-R00
(7) Connect the electrical connector (2) to the solenoid (1).

E. Put the Airplane Back to Its Usual Condition

S 414-016-R00
(1) Install the starter control valve (AMM 80-11-02/401) if the HP3 solenoid was removed.

S 414-017-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(2) Close the left fan cowl panel (AMM 71-11-04/201).

S 724-018-R00

(3) Do the required tests for installation of the bleed solenoids (AMM 71-00-00/501).

ALTITUDE SWITCH - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the data to remove and install the Altitude Switch.
   B. Use the procedures in AMM 70-51-00/201 to tighten the fasteners. Tighten the fasteners to the torque values in AMM 70-51-00/201 unless a torque value is specified in this procedure.

TASK 75-32-07-024-004-R00

2. Remove the Altitude Switch
   A. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          413AL Fan Cowl Panel, Left Engine
          423AL Fan Cowl Panel, Right Engine

   C. Prepare to Remove the Altitude Switch

      S 014-013-R00
      (1) For the left engine, open these circuit breakers and attach the DO-NOT-CLOSE tags:
          (a) P11-3 Overhead Circuit Breaker Panel
              1) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER or LEFT ENGINE EEC LIMITER
              2) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV or LEFT ENGINE EEC SUPV

      S 014-014-R00
      (2) For the right engine, open these circuit breakers and attach the DO-NOT-CLOSE tags:
          (a) P11-4 Overhead Circuit Breaker Panel
              1) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER or RIGHT ENGINE EEC LIMITER
              2) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV or RIGHT ENGINE EEC SUPV

S 014-017-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(3) Open the right fan cowl panel (AMM 71-11-04/201).

D. Remove the Altitude Switch (Fig. 401)

S 014-002-R00

(1) Disconnect the electrical connector (2) from the altitude switch (1).

S 024-005-R00

(2) Remove the bolts (4) that attach the altitude switch (1) to the support bracket.

S 024-019-R00

(3) Remove the altitude switch (1) from the engine.

S 014-006-R00

(4) Install the protection caps to all openings and on the electrical connector (2).

TASK 75-32-07-404-020-R00

3. Install the Altitude Switch

A. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	1	Alitude Switch	75-32-07	01	7
	3	Wire Locking Tab			90
	4	Bolt			80
	5	Washer			85

B. References

(1) AMM 70-50-02/201, Connection of Electrical Plugs

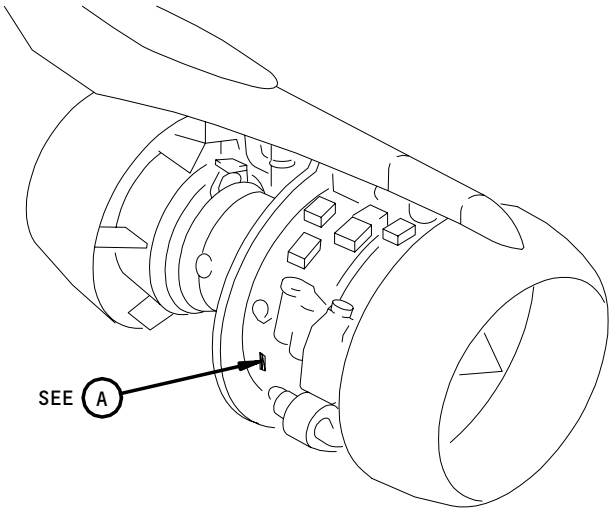
(2) AMM 71-11-04/201, Fan Cowl Panels

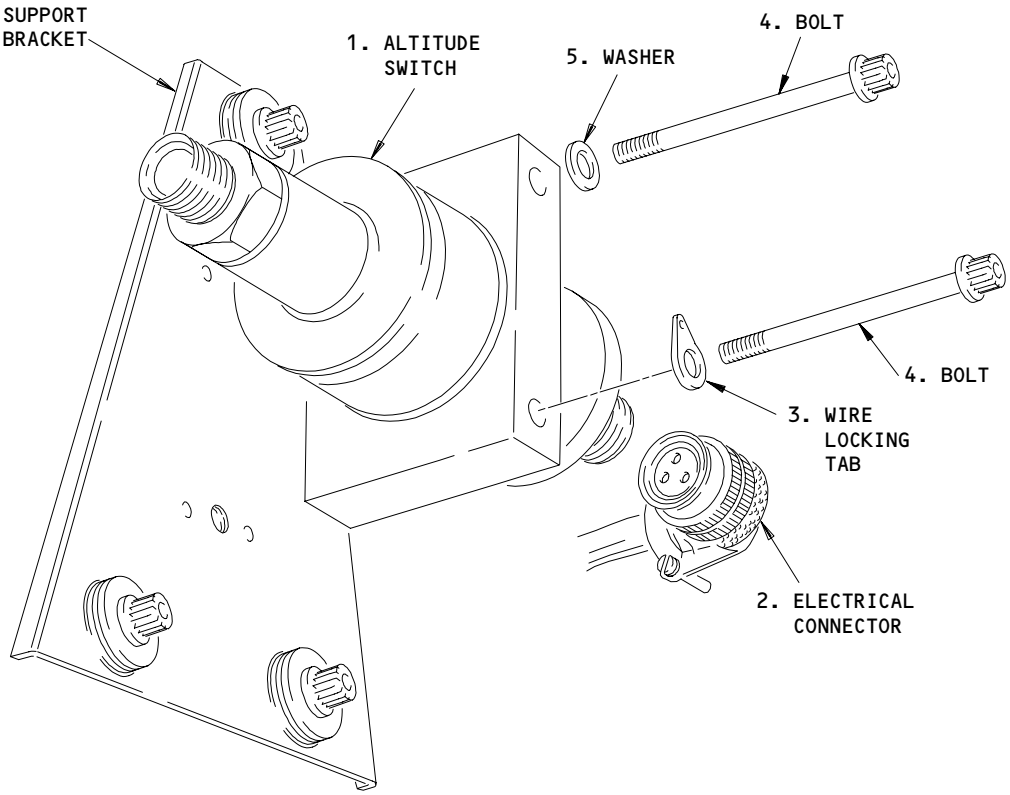
C. Access

(1) Location Zones

410 Left Engine

420 Right Engine





79345

Altitude Switch Installation
Figure 401

(2) Access Panels
413AL Fan Cowl Panel, Left Engine
423AL Fan Cowl Panel, Right Engine

D. Procedure (Fig 401)

S 414-016-R00
(1) Remove the protection caps from all the openings and the electrical connector (2).

S 424-007-R00
(2) Install the altitude switch (1) on the support bracket with the bolts (4), washers (5) and the lockwire tab (3).

S 424-008-R00
(3) Tighten the bolts (4).

S 434-009-R00
(4) Connect the electrical connector (2) to the altitude switch (1) (AMM 70-50-02/201).

E. Put the Airplane Back to its Usual Condition

S 014-018-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(1) Close the right fan cowl panel (AMM 71-11-04/201).

S 414-010-R00
(2) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P11-3 Overhead Circuit Breaker Panel
1) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL LIMITER or LEFT ENGINE EEC LIMITER
2) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL SUPV or LEFT ENGINE EEC SUPV

S 414-011-R00
(3) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P11-4 Overhead Circuit Breaker Panel
1) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL LIMITER or RIGHT ENGINE EEC LIMITER
2) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL SUPV or RIGHT ENGINE EEC SUPV

ALTITUDE SWITCH - ADJUSTMENT/TEST

1. General
   A. This procedure contains a test of the Altitude Switch.
   B. Use the procedures given in AMM 70-50-02/201 for connection of electrical plugs.

   TASK 75-32-07-735-001-R00

2. Altitude Switch Test
   A. Equipment
      (1) Pitot static test set Smiths 3204-KTQ-1
      (2) Power Lead Smiths 0101-KCQ-20
      (3) Continuity meter
      (4) Adapter, 0.5 inch UNF, 20 T.P.I.
   B. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
      (2) AMM 75-32-07/401, Altitude Switch
   C. Access
      (1) Location Zone
          410 Left Engine
          420 Right Engine

      (2) Access Panel
          414AR Fan Cowl Panel (RH)
          424AR Fan Cowl Panel (RH)

   D. Procedure

      S 865-002-R00
      (1) For the left engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:
          (a) P11-2 Overhead Circuit Breaker Panel
              1) 11D21, ENGINES HP BLD VLV LEFT

      S 865-003-R00
      (2) For the right engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:
          (a) P11-2 Overhead Circuit Breaker Panel
              1) 11D22, ENGINES HP BLD VLV RIGHT

      S 015-004-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

      (3) Open the right fan cowl panel (AMM 71-11-04/201).

E. Do the Continuity Test (Fig. 501)

S 035-005-R00
(1) Disconnect the electrical connector (1).

S 765-006-R00
(2) Do a continuity check between pins A and B on the electrical connector (1) of the altitude switch (2).
  (a) If there is continuity, replace the altitude switch (2) (AMM 75-32-07/401).
  (b) If there is no continuity, connect the pitot static test set to the vent connection (3) with an adapter.

S 865-020-R00
(3) Slowly decrease the pressure (Increase altitude) with the test set until the altitude switch (2) operates.

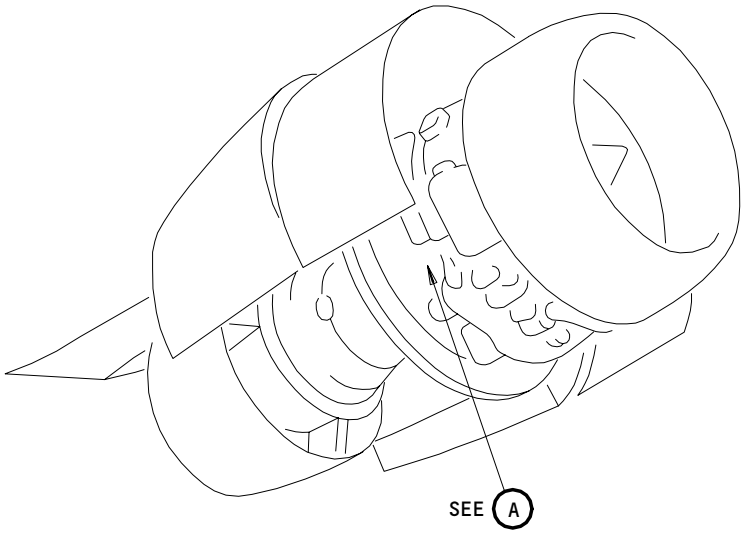
NOTE: The continuity meter shows a change from no continuity to continuity (i.e. open circuit to short circuit) when the altitude switch (2) operates.

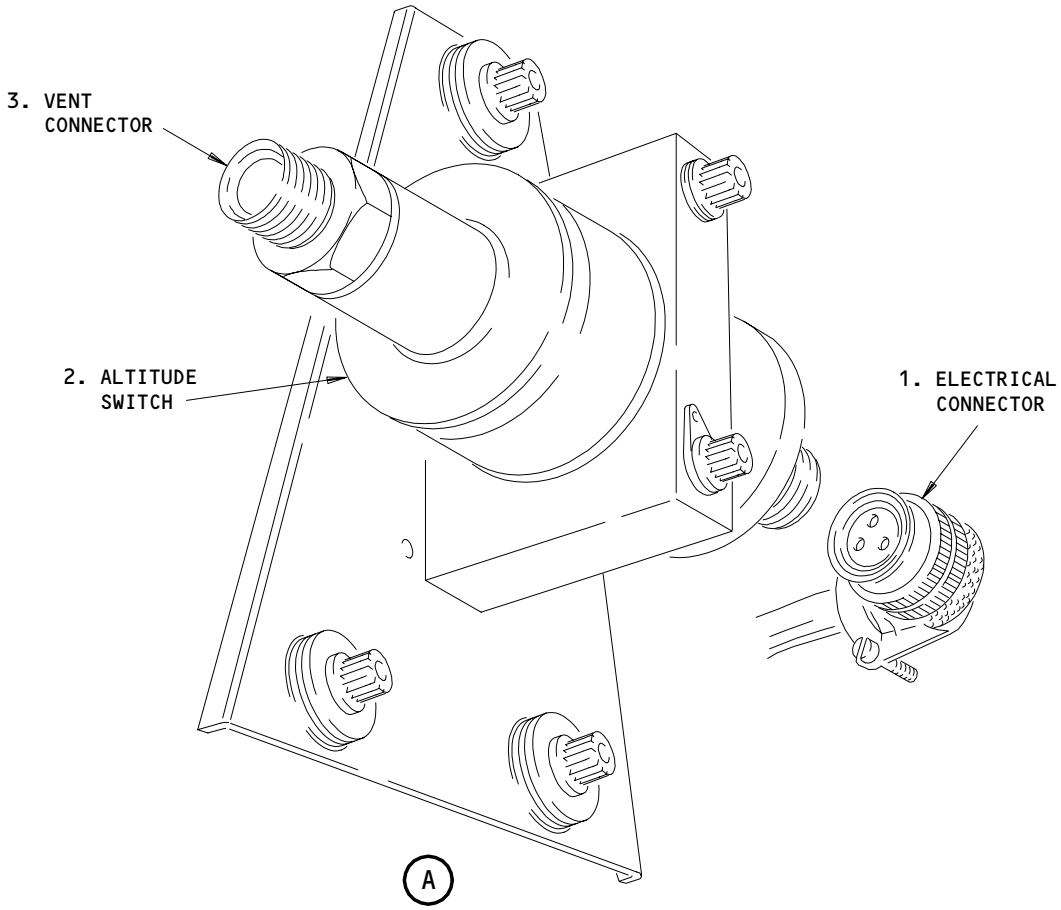
S 975-008-R00
(4) Make a record of the pressure from the test set at which the altitude switch (2) operates.

S 225-009-R00
(5) If the pressure at which the altitude switch (2) operates is not between 6.9 and 7.6 psia (475.8 to 522.9 millibars, 14.00 to 15.5 inches Hg or 19600 to 17200 ft pressure altitude), replace the altitude switch (2) (AMM 75-32-07/401).

S 865-021-R00
(6) Slowly increase the pressure (Decrease altitude) until the altitude switch (2) operates.

NOTE: The continuity meter shows a change from continuity to no continuity (short circuit to open circuit) when the altitude switch (2) operates.





Attitude Switch Functional Check
Figure 501

S 975-011-R00
(7) Make a record of the pressure from the test set at which the altitude switch (2) operates.

S 225-012-R00
(8) If the pressure at which the altitude switch (2) operates is not between 7.2 and 7.9 psia (496.4 to 544.5 millibars, 14.6 to 16.1 inches Hg or 18500 to 16100 ft pressure altitude), replace the altitude switch (2) (AMM 75-32-07/401).

S 975-013-R00
(9) Calculate the difference between the pressures you wrote down.

S 225-014-R00
(10) If the difference is less than 0.3 psia (20.7 millibars, 0.61 inches Hg or 1000 ft altitude pressure), replace the altitude switch (2) (AMM 75-32-07/401).

S 435-015-R00
(11) Connect the electrical connector (1).

S 415-016-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(12) Close the right fan cowl panel (AMM 71-11-04/201).

S 865-017-R00
(13) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D21, ENGINES HP BLD VLV LEFT

S 865-018-R00
(14) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D22, ENGINES HP BLD VLV RIGHT

HP AND IP COMPRESSOR BLEED CONTROL AIR TUBES - INSPECTION/CHECK

1. General
   A. This procedure contains the data to visually examine the HP and the IP Compressor Bleed Control (CBC) Air Tubes.

TASK 75-32-09-226-001-R00

2. Examine the HP and the IP Compressor Bleed Control Air Tubes
   A. References
      (1) AMM 71-11-04/201, Fan Cowl Panels
      (2) AMM 72-03-01/401, Compressor Fairings
      (3) AMM 78-31-00/201, Fan Thrust Reverser
   B. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          413AL Fan Cowl Panel, Left Engine
          414AR Fan Cowl Panel, Left Engine
          415AL Thrust Reverser, Left Engine
          416AR Thrust Reverser, Left Engine
          423AL Fan Cowl Panel, Right Engine
          424AR Fan Cowl Panel, Right Engine
          425AL Thrust Reverser, Right Engine
          426AR Thrust Reverser, Right Engine

   C. Prepare to Examine the Air Tubes

      S 016-006-R00

      WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

      (1) Open the thrust reversers (AMM 78-31-00/201).

      S 016-005-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

      S 016-002-R00
      (3) Remove the applicable compressor fairings (AMM 72-03-01/401).

D. Procedure

S 226-003-R00

(1) Use these standards to examine the air tubes:

(a) Cracks

1) No cracks are permitted.

(b) Dents

1) Smooth dents with a large area in relation to depth are permitted if:

a) The tube is 90 percent of its initial diameter or greater.

b) The dent is at a greater distance than 0.500 inch (12.725 mm) from the tube end fitting

OR

The dent is at a greater distance than one diameter of the tube from the tube end fitting.

c) The dents are not on the outer surface of a bend.

2) Smooth dents not more than 0.125 square inches (80.60 sq. mm) in area are permitted if:

a) The dents are rounded at the bottom.

b) The dents on the outer surface of a bend are not more than 0.015 inch (0.381 mm) in depth.

c) The dents on the remaining section of the tube are not more than 0.025 inch (0.635 mm) in depth.

d) The dent is at a greater distance than 0.500 inch (12.725 mm) from the tube end fitting

OR

The dent is at a greater distance than one diameter of the tube from the tube end fitting.

(c) Nicks

1) Nicks that are rounded at the bottom are permitted if:

a) The nicks are not more than 0.004 inch (0.101 mm) in depth.

b) All burrs are removed.

(d) Fretting

1) Fretting up to a maximum depth of 0.007 inch (0.177 mm) is permitted if:

a) The fretting is on the outer surface of a bend or 0.010 inch (0.254 mm) on the remaining sections of the tube.

(e) Scoring

1) Light scoring can be made smooth if not more than 0.005 inch (0.127 mm) in depth is removed from the tube wall.

E. Put the Airplane Back to Its Usual Condition

S 416-004-R00

(1) Install the compressor fairings (AMM 72-03-01/401).

S 416-008-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

S 416-007-R00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(3) Close the thrust reverser (AMM 78-31-00/201).

IP BLEED VALVE ACOUSTIC ATTENUATOR - REMOVAL/INSTALLATION

1. General
   A. This procedure contains the data to remove and install the IP Bleed Valve Acoustic Attenuator.
   B. The IP Bleed Valve Acoustic Attenuator will be referred to as the Acoustic Attenuator.

TASK 75-32-10-004-001-R00

2. Remove the IP Bleed Valve Acoustic Attenuator
   A. References
      (1) AMM 72-03-01/401, Compressor Fairings
      (2) AMM 78-31-00/201, Thrust Reverser System
   B. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          415AL Thrust Reverser, Left Engine
          416AR Thrust Reverser, Left Engine
          425AL Thrust Reverser, Right Engine
          426AR Thrust Reverser, Right Engine

   C. Prepare for the Removal of the Acoustic Attenuator

      S 014-014-R00

      WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

      (1) Open the thrust reversers (AMM 78-31-00/201).

      S 014-003-R00
      (2) Remove the applicable compressor fairing (AMM 72-03-01/401).

D. Remove the Acoustic Attenuator (Fig. 401)

S 034-004-R00
(1) Remove the screws that attach the acoustic attenuator to the IP bleed valve.

S 024-013-R00
(2) Remove the acoustic attenuator.

S 034-005-R00
(3) Install a protection cap on the IP bleed valve.

TASK 75-32-10-404-006-R00

3. Install the IP Bleed Valve Acoustic Attenuator

A. References
(1) AMM 72-03-01/401, Compressor Fairings
(2) AMM 78-31-00/201, Thrust Reverser System

B. Access
(1) Location Zones
411 Left Engine
421 Right Engine

(2) Access Panels
415AL Thrust Reverser, Left Engine
416AR Thrust Reverser, Left Engine
425AL Thrust Reverser, Right Engine
426AR Thrust Reverser, Right Engine

C. Procedure

S 434-007-R00
(1) Remove the protection cap from the IP bleed valve.

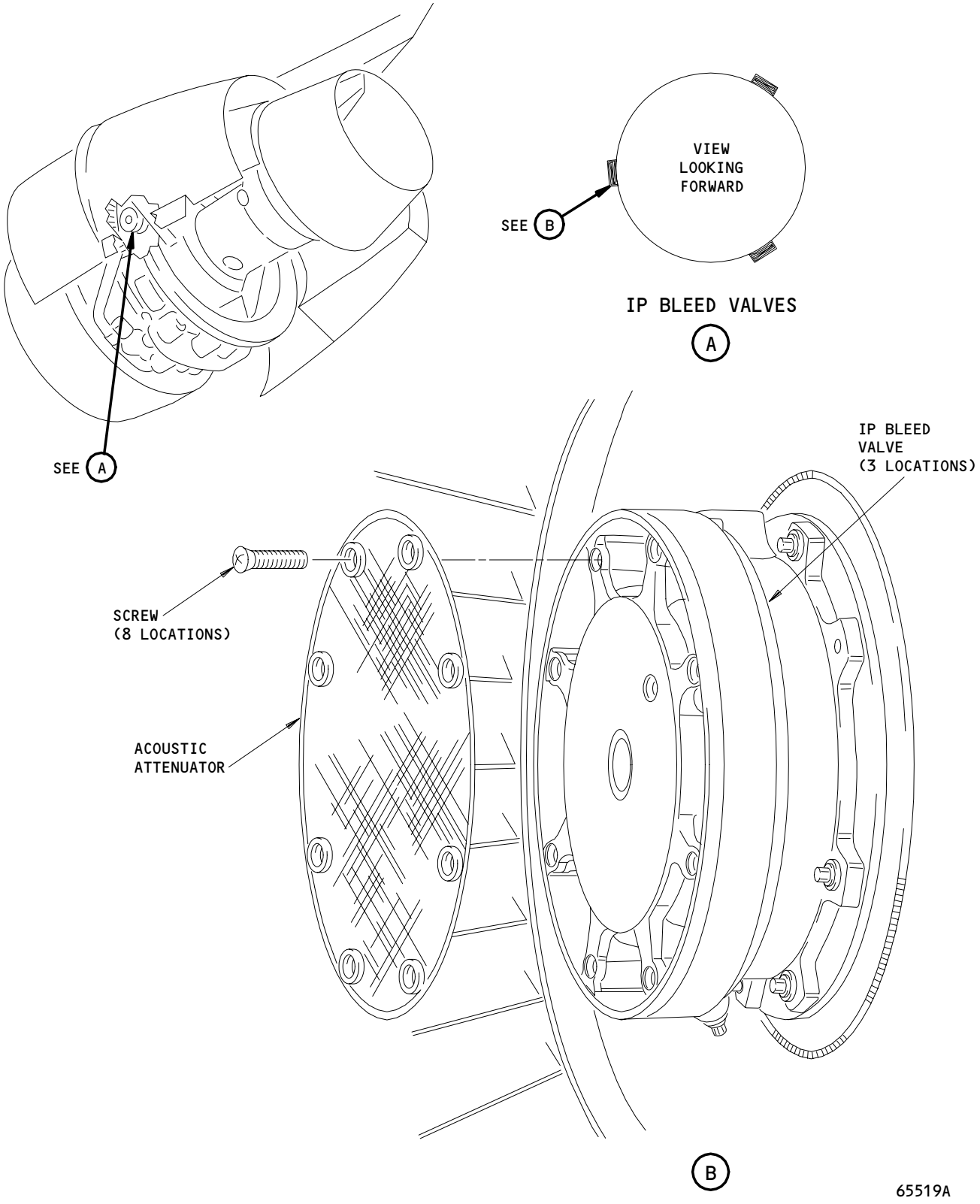
S 424-008-R00
(2) Put the acoustic attenuator onto the IP bleed valve.

S 424-009-R00
(3) Attach the acoustic attenuator to the IP bleed valve with the screws.

S 434-012-R00
(4) Tighten the screws to 30-35 pound-inches (3.4 - 40.0 Newton meters).

D. Put the Airplane Back to Its Usual Condition

S 414-010-R00
(1) Install the applicable compressor fairing (AMM 72-03-01/401).



IP Bleed Valve Acoustic Attenuator Installation
Figure 401

S 414-011-R00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Close the thrust reversers (AMM 78-31-00/201).

IP BLEED VALVE ACOUSTIC ATTENUATOR - INSPECTION/CHECK

1. General
   A. This procedure contains the data to visually examine the IP Bleed Valve Acoustic Attenuator (referred to as the Attenuator).

TASK 75-32-10-206-006-R00

2. Examine the IP Bleed Valve Acoustic Attenuator
   A. References
      (1) AMM 72-03-01/401, Compressor Fairings
      (2) AMM 75-32-10/401, IP Bleed Valve Acoustic Attenuator
      (3) AMM 78-31-00/201, Thrust Reverser System

   B. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          415AL Thrust Reverser, Left Engine
          416AR Thrust Reverser, Left Engine
          425AL Thrust Reverser, Right Engine
          426AR Thrust Reverser, Right Engine

   C. Prepare to Examine the Attenuator

      S 016-001-R00

      WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

      (1) Open the thrust reversers (AMM 78-31-00/201).

      S 016-002-R00
      (2) Remove the applicable compressor fairing (AMM 72-03-01/401).
   D. Procedure

      S 226-003-R00
      (1) Use the standards given below to examine the attenuator.
          (a) Continuous cracks and breaks to a maximum angle of 180 degrees are permitted.
          (b) If the attenuator is attached in 4 locations, accept cracks in the outer stiffening ring.
          (c) If the attenuator has cracks and breaks that are more than the two steps above, replace the attenuator (AMM 75-32-10/401).

(d) A fly-on limit of not more than 90 days is permitted before a damaged bleed valve attenuator is replaced.

E. Put the Airplane Back to Its Usual Condition

S 416-004-R00

(1) Install the applicable compressor fairing (AMM 72-03-01/401).

S 416-005-R00

WARNING: OBEY THE INSTRUCTIONS IN 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

(2) Close the thrust reversers (AMM 78-31-00/201).

T2 SONIC THERMOCOUPLE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the T2 Sonic Thermocouple. The second task is to install the T2 Sonic Thermocouple.
   B. Use the procedures given in 70-51-00/201 to tighten fasteners. Tighten the fasteners to the torque values given in 70-51-00/201 unless a torque value is specified in this procedure.

TASK 75-32-12-004-001-R00

2. Remove the T2 Sonic Thermocouple
   A. Equipment
      (1) Spatula or Pallete Knife
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 72-31-13/401, LP Compressor Rotor Blades
   C. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          412 Left Nose Cowl
          422 Right Nose Cowl

   D. Prepare to Remove the T2 Sonic Thermocouple (Fig. 401)

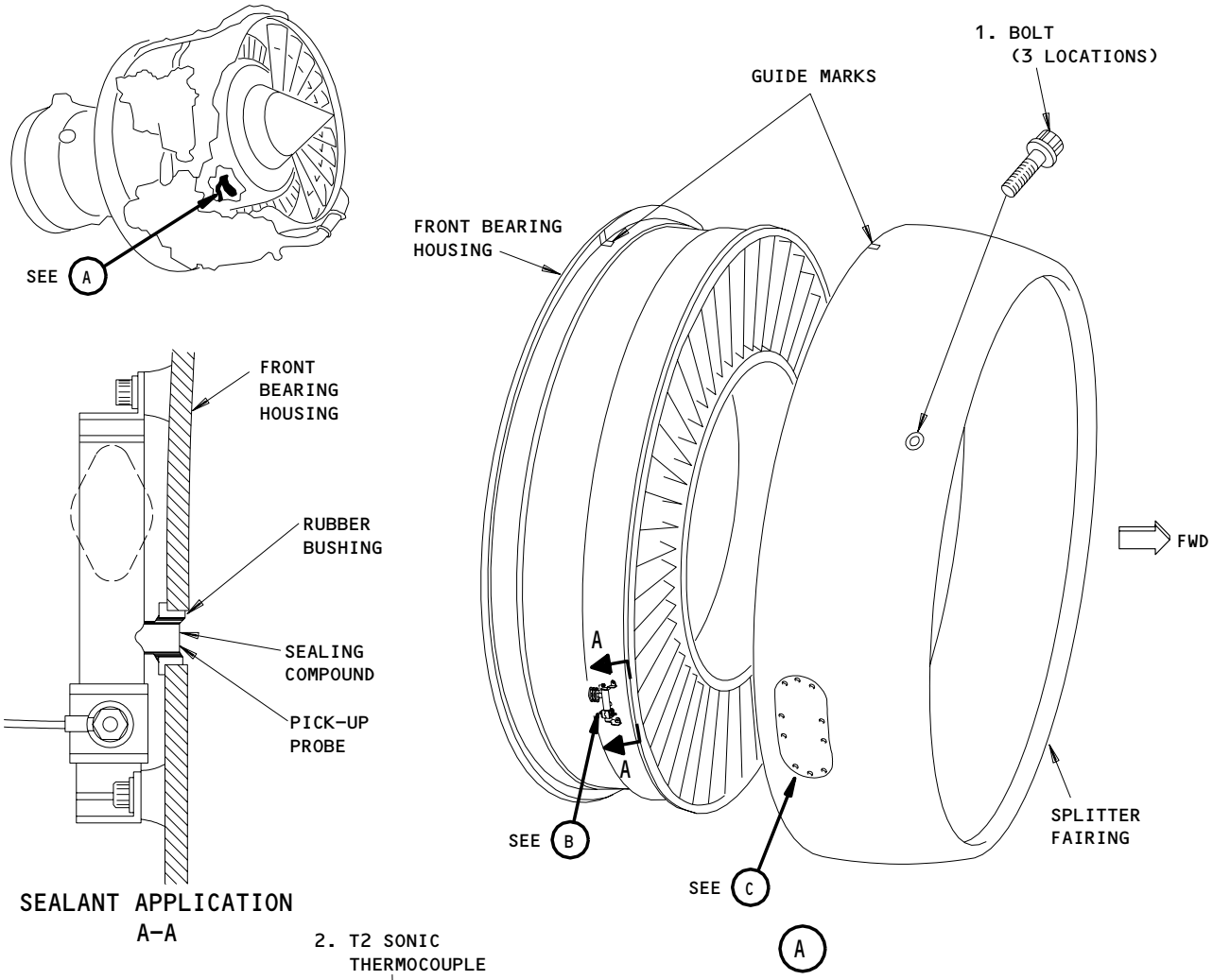
      S 864-002-R00
      (1) Remove the electrical power (AMM 24-22-00/201).

      S 024-005-R00
      (2) Remove the four LP compressor rotor blades (AMM 72-31-13/401).
          (a) Use a temporary marker to identify the blade positions.

      S 034-007-R00
      (3) Turn the LP compressor to release the screws (7) that attach the access plate (6) to the splitter fairing.

      S 034-008-R00
      (4) Remove the access plate (6).

      S 034-011-R00
      (5) Turn the LP compressor to remove the silcoset sealing compound to permit access to the bolts (1).



T2 Sonic Thermocouple Installation
Figure 401

S 024-064-R00
(6) Remove the IP Compressor Splitter Fairing (AMM 72-35-02/401).

S 034-016-R00
(7) Turn the LP compressor to get access to the thermocouple (2).
(a) Attach the LP compressor rotor blades to the outlet guide vanes of the LP compressor with a light rope at three points with equal separation.

S 034-018-R00
(8) Move the splitter fairing to permit the removal of the thermocouple (2).

E. Procedure

S 034-019-R00
(1) Remove the nut, spring washer, flat washer and thermocouple leads (5) (2 locations).

S 034-020-R00
(2) Disconnect the tube (4).
(a) Discard the corrujoint gasket (3).

S 034-021-R00
(3) Disconnect and remove the thermocouple (2).

TASK 75-32-12-404-022-R00

3. Install the T2 Sonic Thermocouple

A. Equipment
(1) Spatula or Pallete Knife

B. Consumable Materials
(1) Sealing compound, Silcoset 152
OMat No. 872
(2) Degreasing fluid, inhibited and stabilized 1.1.1. trichloroethane
OMat No. 1/21
(3) Lint free cloth - Local resources

C. References
(1) AMM 24-22-00/201, Electrical Power - Control
(2) AMM 71-00-00/501, Power Plant
(3) AMM 72-35-02/401, IP Compressor Splitter Fairing
(4) AMM 75-32-00/201, BVCU Interrogation

D. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panel
412 Nose Cowl
422 Nose Cowl

E. Procedure (Fig. 401)

S 434-023-R00
(1) Make sure the rubber bushing is tightly installed in the thermocouple probe opening of the front bearing housing.

S 114-024-R00
(2) Make sure you remove all unwanted sealing compound.

S 624-025-R00
(3) Apply a layer of the silcoset sealing compound on the thermocouple probe (2), but not in the probe hole.

S 434-026-R00
(4) Carefully install the thermocouple probe into the rubber bushing in the front bearing housing.

S 824-027-R00
(5) Align the lugs with the mounting bosses.

S 434-028-R00
(6) Install the bolts that attach the thermocouple (2 locations).

S 624-029-R00
(7) Apply a bead of the silicoset sealing compound around the thermocouple probe and rubber bushing in the front bearing housing.

S 434-053-R00

CAUTION: MAKE SURE THE CORRUJOINT GASKET (3) IS CORRECTLY INSTALLED BETWEEN THE JOINT FLANGES. IT MUST BE ATTACHED WITH BOTH BOLTS THROUGH THE CORRECT HOLES IN THE GASKET. IF NOT CORRECTLY ALIGNED THE GASKET WILL PARTLY BLOCK THE T2 SONIC THERMOCOUPLE TUBE BORE. THIS CAN CAUSE SURGE EVENT.
(8) Install a new corrujoint gasket (3) on the tube (4) connector.

S 434-031-R00
(9) Install the tube (4) with the bolts.

S 434-032-R00
(10) Install the thermocouple leads (5) (2 locations) with the nut, spring washer and flat washer.

S 414-065-R00
(11) Install the IP Compressor Splitter Fairing (AMM 72-35-02/401).

F. Put the Airplane Back to its Usual Condition

S 864-049-R00
(1) Supply the electrical power (AMM 24-22-00/201).

S 714-050-R00
(2) Do an engine test with the Power Plant Test Reference Table, Test 6, (AMM 71-00-00/201).

S 744-051-R00
(3) Do the BVCU Interrogation procedure (AMM 75-32-00/201).

POWER LEVER ANGLE (PLA) BLEED VALVE CONTROL UNIT (BVCU) AND AUTOTHROTTLE TRANSDUCER - REMOVAL/INSTALLATION

1. General
   A. The PLA transducer is found on the right side of the engine at approximately the 3 o'clock position.
      The transducer supplies one signal to the Bleed Valve Control Unit (BVCU) and one signal to the autothrottle.

   TASK 75-32-14-004-001-R00

2. Remove the PLA Transducer
   A. References
      (1) AMM 24-22-00/201, Electrical Power-Control
      (2) AMM 71-11-04/201, Fan Cowl Panels
   B. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          413AL Fan Cowl Panel, Left Engine
          423AL Fan Cowl Panel, Right Engine

   C. Prepare to Remove the PLA Transducer

      S 864-002-R00
      (1) Move the thrust levers to the idle position and attach DO-NOT-OPERATE tags.

      S 864-003-R00
      (2) Supply the electrical power (AMM 24-22-00/201).

      S 864-004-R00
      (3) For the left engine, make sure this circuit breaker is closed:
          (a) P6-1 Main Power Distribution Panel
              1) 6E1, FUEL VALVES L SPAR

      S 864-005-R00
      (4) For the right engine, make sure this circuit breaker is closed:
          (a) P6-1 Main Power Distribution Panel
              1) 6E2, FUEL VALVES R SPAR

      S 864-006-R00
      (5) Make sure the FUEL CONTROL switch on the control stand is in the CUTOFF position and attach a DO-NOT-OPERATE tag.

      S 864-007-R00
      (6) Make sure the ENG VALVE and FUEL SPAR lights on the control stand are off.

S 864-008-R00

(7) For the left engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:
   (a) P6-1 Main Power Distribution Panel
      1) 6E1, FUEL VALVES L SPAR

S 864-009-R00

(8) For the right engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:
   (a) P6-1 Main Power Distribution Panel
      1) 6E2, FUEL VALVES R SPAR

S 864-010-R00

(9) For the left engine, open these circuit breakers and attach DO-NOT-CLOSE tags:
   (a) P11-3 Overhead Circuit Breaker Panel
      1) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL (EEC) LIMITER
      2) 11L7, LEFT ENGINE IDLE CONTROL
      3) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL (EEC) SUPV (If installed)

S 864-011-R00

(10) For the right engine, open these circuit breakers and attach DO-NOT-CLOSE tags:
   (a) P11-4 Overhead Circuit Breaker Panel
      1) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL (EEC) LIMITER
      2) 11L33, RIGHT ENGINE IDLE CONTROL
      3) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL (EEC) SUPV (If installed)

S 864-012-R00

(11) Open these circuit breakers and attach DO-NOT-CLOSE tags:
   (a) P11-1 Overhead Circuit Breaker Panel
      1) 11F14, AUTO FLIGHT TMC AC
      2) 11F16, AUTO FLIGHT TMC SERVO

S 864-013-R00

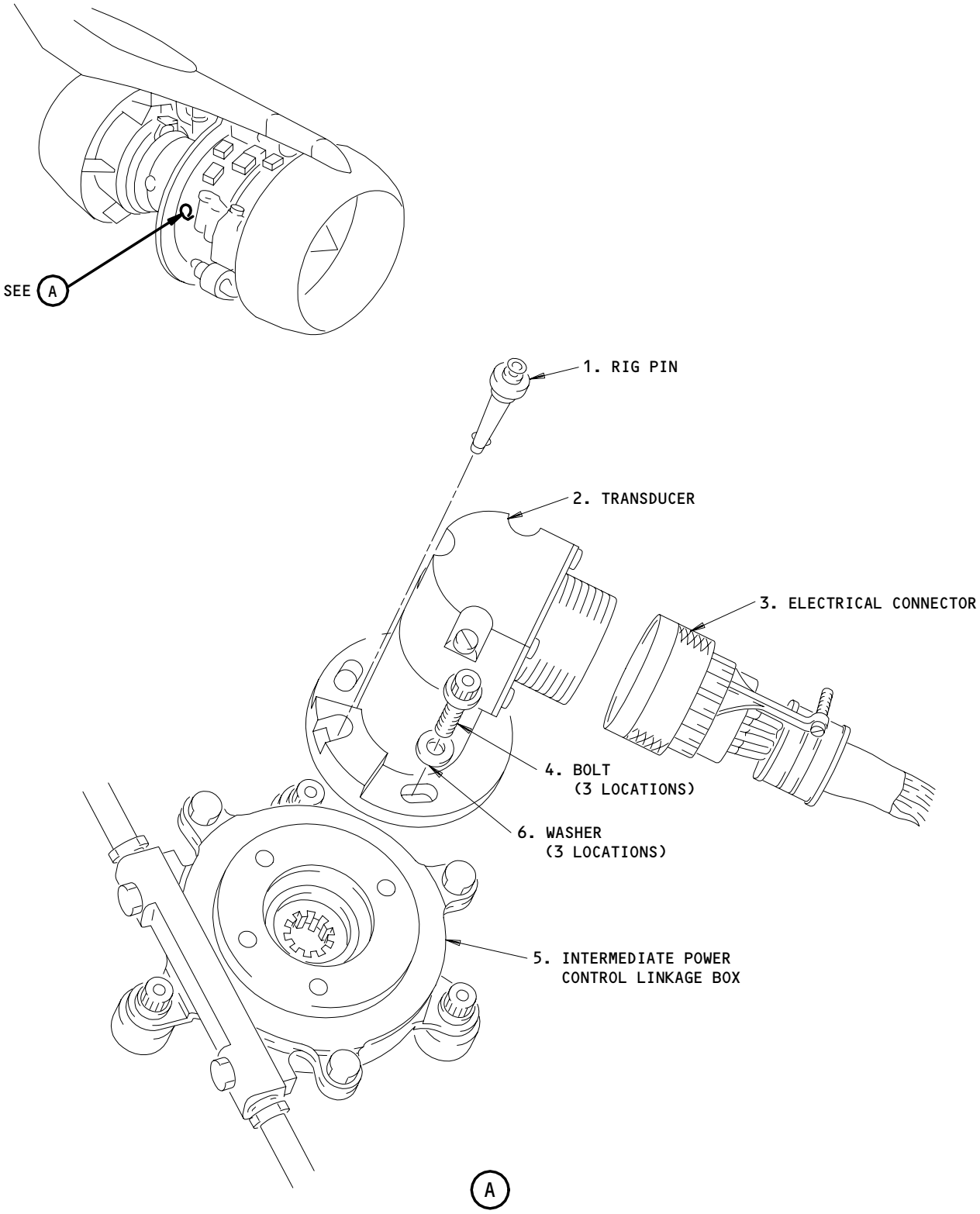
(12) Remove the electrical power (AMM 24-22-00/201).

S 014-014-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(13) Open the right fan cowl panel (AMM 71-11-04/201).

D. Procedure (Fig. 401)



Power Lever Angle (PLA) Bleed Valve Control Unit (BVCU) and Autothrottle Transducer - Removal/Installation
Figure 401

69534A

S 864-015-R00
(1) Disconnect the electrical connector (3).

S 034-016-R00

CAUTION: DO NOT APPLY SIDE LOADS TO THE TRANSDUCER WHEN YOU PULL THE SPLINED SHAFT OUT. IF YOU APPLY SIDE LOADS TO THE TRANSDUCER, DAMAGE TO THE SMALL TOLERANCE FIT BETWEEN THE SHAFT AND SOCKET CAN OCCUR.

(2) Remove the bolts (4) that attach the transducer (2) to the intermediate control box (5).

S 024-017-R00
(3) Pull the transducer from the intermediate control box.

S 434-018-R00
(4) Install dust caps on all openings.

TASK 75-32-14-404-019-R00

3. Install the PLA Tranducer

A. Equipment
(1) UT1315/1 - Rig Pin
(2) VTVM, Hewlitt Packard, Model 427A

B. Parts

AMM		NOMENCLATURE	AIPC		
FIG	ITEM		SUBJECT	FIG	ITEM
401	2	Transducer - PLA BVCU	75-32-06	02	5
	4	Bolt			10
	6	Washer			15

C. References
(1) AMM 22-00-02/201, Autoflight BITE

(2) AMM 24-22-00/201, Electrical Power-Control
(3) AMM 71-11-04/201, Fan Cowl Panels
(4) AMM 76-11-00/501, Engine Control Systems

D. Access

(1) Location Zones

410 Left Engine
420 Right Engine

(2) Access Panels

413AL Fan Cowl Panel, Left Engine
423AL Fan Cowl Panel, Right Engine

E. Prepare to Install the PLA Transducer

S 864-020-R00

(1) Make sure the thrust levers are in the idle position and attach DO-NOT-OPERATE tags.

S 864-021-R00

(2) Make sure the electrical power is removed (AMM 24-22-00/201).

S 014-022-R00

(3) Make sure the right fan cowl panel is open (AMM 71-11-04/201).

S 034-023-R00

(4) Remove the dust caps from the openings.

S 424-024-R00

CAUTION: DO NOT APPLY SIDE LOADS TO THE SPLINED SHAFT OF THE TRANSDUCER. IF YOU APPLY SIDE LOADS TO THE SPLINED SHAFT, DAMAGE THE THE SMALL TOLERANCE FIT BETWEEN THE SHAFT AND SOCKET CAN OCCUR.

(5) Align the master splines on the transducer (2) with the intermediate control box (5).

S 034-025-R00
(6) Push the transducer splines into the socket until they are fully engaged.

S 224-026-R00
(7) Turn the transducer body through its full range to make sure it moves freely.

S 434-027-R00
(8) Align the rig pin hole in the tranducer flange with the hole in the intermediate control box and install the rig pin (1).

S 434-028-R00
(9) Install the washers (6) and bolts (4).

S 034-029-R00
(10) Remove the rig pin.

S 434-030-R00
(11) Install the electrical connector (3).

S 034-031-R00
(12) Remove the DO-NOT-OPERATE tags from the thrust levers.

S 224-032-R00
(13) Operate the controls many times to make sure the fuel flow governor lever has full travel in the forward thrust range.
(a) If the FFG lever does not have full travel, examine the engine control system (AMM 76-11-00/501).

S 414-033-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF YOU DO NOT OBEY THE PRECAUTIONS, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(14) Close the right fan cowl panel (AMM 71-11-04/201).

S 034-034-R00
(15) Remove the DO-NOT-OPERATE tag from the FUEL CONTROL switch.

S 864-035-R00
(16) For the left engine, remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P11-3 Overhead Circuit Breaker Panel
1) 11L4, LEFT ENGINE ELECTRONIC ENGINE CONTROL (EEC) LIMITER
2) 11L7, LEFT ENGINE IDLE CONTROL
3) 11L5, LEFT ENGINE ELECTRONIC ENGINE CONTROL (EEC) SUPV (If installed)

S 864-036-R00
(17) For the right engine, remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P11-4 Overhead Circuit Breaker Panel
1) 11L31, RIGHT ENGINE ELECTRONIC ENGINE CONTROL (EEC) LIMITER
2) 11L33, RIGHT ENGINE IDLE CONTROL
3) 11L32, RIGHT ENGINE ELECTRONIC ENGINE CONTROL (EEC) SUPV (If installed)

S 864-037-R00
(18) For the left engine, remove the DO-NOT-CLOSE tags and close this circuit breaker:
(a) P6-1 Main Power Distribution Panel
1) 6E1, FUEL VALVES L SPAR

S 864-038-R00
(19) For the right engine, remove the DO-NOT-CLOSE tags and close this circuit breaker:
(a) P6-1 Main Power Distribution Panel
1) 6E2, FUEL VALVES R SPAR

S 864-039-R00
(20) Remove the DO-NOT-CLOSE tags and close these circuit breakers:
(a) P11-1 Overhead Circuit Breaker Panel
1) 11F14, AUTO FLIGHT TMC AC
2) 11F16, AUTO FLIGHT TMC SERVO

F. Adjust the PLA Transducer

S 714-044-R00
(1) Do the MCDP Ground Test 66-XDCR OUTPUTS (AMM 22-00-02/201).

S 714-045-R00
(2) Operate the YES/ADV switch until "66 PLA Deg/L/R" is shown.

S 714-046-R00
(3) Turn the transducer until 50 ±1 degree is shown on the MCDP.

S 714-047-R00
(4) Tighten the transducer mounting bolts while you keep the MCDP display to ±0.25 degrees of the set value.

G. Test the PLA Transducer

S 714-048-R00
(1) Put the A/T switch on the AFCS mode control panel P55 to the A/T ARM position.

S 714-049-R00
(2) Do the MCDP Ground Test 10-SERVO A/T (AMM 22-00-02/201).

S 714-050-R00
(3) Put the A/T switch on the AFCS mode control panel to the OFF position.

S 724-052-R00
(4) Do the required tests for installation of the PLA transducer (AMM 71-00-00/501).

TRANSIENT PRESSURE SENSOR UNIT - MAINTENANCE PRACTICES

TASK 75-32-15-742-001-R00

1. TPU BITE Procedure

A. General

(1) This procedure contains steps to read the fault codes from the Transient Pressure Unit (TPU).

B. References

(1) AMM 24-22-00/201, Electric Power - Control
(2) AMM 71-11-04/201, Fan Cowl Panels
(3) FIM 75-32-00/101, Compressor Bleed Control System

C. Access

(1) Location Zones
410 Left Engine
420 Right Engine

(2) Access Panels
413 Fan Cowl Panel (LH)
423 Fan Cowl Panel (LH)

D. Do the TPU BITE Procedure

S 862-002-R00

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

S 862-003-R00

(2) For the left engine, make sure this circuit breaker is closed:
(a) P11 Overhead Circuit Breaker Panel
1) 11D21, ENGINE HP BLD VLV LEFT

S 862-004-R00

(3) For the right engine, make sure this circuit breaker is closed:
(a) P11 Overhead Circuit Breaker Panel
1) 11D22, ENGINE HP BLD VLV RIGHT

S 012-005-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(4) Open the left fan cowl panel (AMM 71-11-04/201).

S 862-006-R00

(5) Put the TPU ground test switch to the ON position.

S 812-007-R00

(6) If there are fault codes shown in the fault code window, do the corrective action in Figure 104 for that code (FIM 75-32-00/101).

S 862-009-R00

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

S 412-010-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(8) Close the left fan cowl panel (AMM 71-11-04/201).

TRANSIENT PRESSURE SENSOR UNIT - REMOVAL/INSTALLATION

TASK 75-32-15-004-001-R00

1. Remove Transient Pressure Sensor Unit (TPU)

A. General

(1) Use the procedures given in AMM 70-02-01/201 for identification, lubricant, and installation of rubber seal rings.

(2) Use the procedures given in AMM 70-51-00/201 to tighten fasteners.

(3) Tighten the fasteners to the torque values given in AMM 70-51-00/201 unless a torque value is specified in this procedure.

B. References

(1) AMM 71-11-04/201, Fan Cowl Panels

C. Access

(1) Location Zone

410 Left Engine
420 Right Engine

(2) Access Panels

413AL Left Engine Fan Cowl Panel (LH)
423AL Right Engine Fan Cowl Panel (RH)

D. Prepare to Remove the TPU

S 864-002-R00

(1) For the left engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:

(a) P11-2 Overhead Circuit Breaker Panel

1) 11D21, ENGINES HP BLD VLV LEFT

S 864-003-R00

(2) For the right engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:

(a) P11-2 Overhead Circuit Breaker Panel

1) 11D22, ENGINES HP BLD VLV RIGHT

S 014-004-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(3) Open the left fan cowl panel (AMM 71-11-04/201).

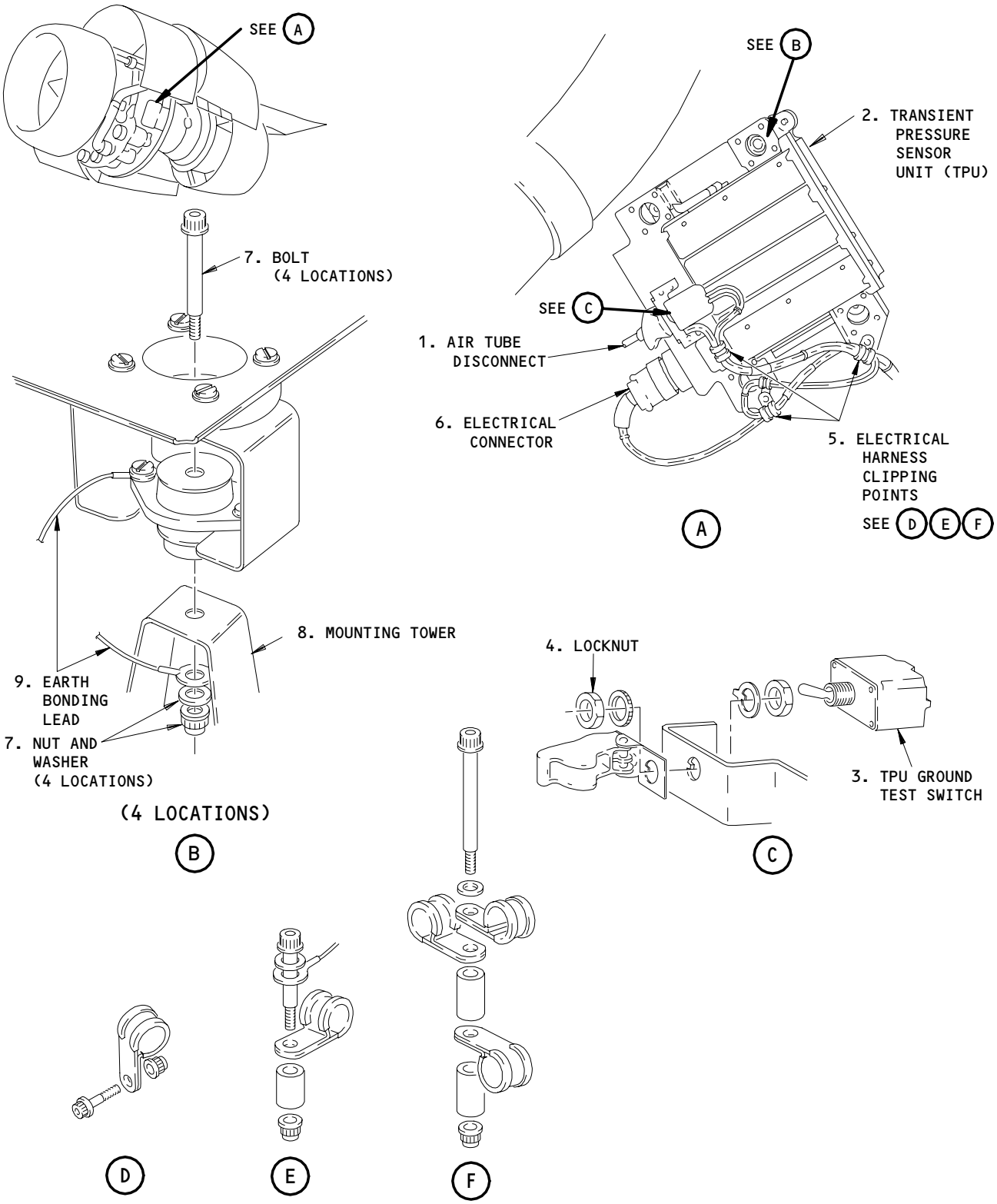
E. Remove the TPU (Fig. 401)

S 034-005-R00

(1) Disconnect the electrical connector (6).

S 034-006-R00

(2) Disconnect the air tube (1).



93497

Transient Pressure Sensor Unit Installation
Figure 401

S 034-007-R00
(3) Remove the clips from the harness clip points (5).

S 034-008-R00
(4) Remove the locknut (4) to release the test switch (3).

S 034-009-R00
(5) Remove the nuts, washers and bolts (7) that attach the mounting plate assembly to the mounting towers.

S 024-010-R00
(6) Lift the TPU and the mounting plate assembly clear of the engine.

S 434-011-R00
(7) Install the approved covers on the electrical connectors.

TASK 75-32-15-404-012-R00

2. Install the Transient Pressure Sensor Unit (TPU)

A. Consumable Materials
(1) Lockwire
British Spec/Ref - DTD 189A, 22 SWG
American Spec/Ref - 21 AWG
OMat No. 239

B. References
(1) AMM 71-11-04/201, Fan Cowl Panels
(2) AMM 75-32-15/501, Transient Pressure Sensor Unit

C. Access
(1) Location Zone
410 Left Engine
420 Right Engine

(2) Access Panels
413AL Left Engine Fan Cowl Panel (LH)
423AL Right Engine Fan Cowl Panel (RH)

D. Prepare to Install the TPU

S 864-013-R00
(1) For the left engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D21, ENGINE HP BLD VLV LEFT

S 864-014-R00
(2) For the right engine, open this circuit breaker and attach a DO-NOT-CLOSE tag:
(a) P11-2 Overhead Circuit Breaker Panel
1) 11D22, ENGINE HP BLD VLV RIGHT

S 014-026-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(3) Open the left fan cowl panel (AMM 71-11-04/201).

E. Install the TPU (Fig. 401)

S 424-015-R00

(1) Put the TPU and the mounting plate assembly on the mounting towers (8).

S 434-016-R00

(2) Install the nuts, washers and bolts (7).
(a) Tighten the nuts (7).
(b) Make sure the bonding lead (9) is connected.

S 424-017-R00

(3) Put the test switch (3) on the mounting lug and attach it with the locknut (4).

NOTE: Make sure one to two threads are shown at the guard cover mounting face when the locknuts are tightened.

(a) Install the lockwire.

S 434-018-R00

(4) Put the harness clips at clip positions (5).

S 424-027-R00

(5) Install the nuts, washers and bolts at clip postions (5).
(a) Tighten the nuts.

S 434-019-R00

(6) Connect the air tube (1).
(a) Tighten the air tube (1).
(b) Install the lockwire.

S 034-020-R00

(7) Remove the approved covers from the electrical connectors.

S 434-021-R00

(8) Connect the electrical connector (6).
(a) Tighten the electrical connector (6).

S 414-025-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

(9) Close the left fan cowl panel (AMM 71-11-04/201).

S 864-022-R00

(10) For the left engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
  (a) P11-2 Overhead Circuit Breaker Panel
    1) 11D21, ENGINES HP BLD VLV LEFT

S 864-023-R00

(11) For the right engine, remove the DO-NOT-CLOSE tag and close this circuit breaker:
  (a) P11-2 Overhead Circuit Breaker Panel
    1) 11D22, ENGINES HP BLD VLV RIGHT

S 734-024-R00

(12) Do the TPU adjustment test procedure (AMM 75-32-15/501).

TRANSIENT PRESSURE SENSOR UNIT - ADJUSTMENT/TEST

1. General
   A. After the installation of a transient pressure sensor unit (TPU) an operational test must be done to make sure the TPU operates correctly.

TASK 75-32-15-705-001-R00

2. The TPU - Adjustment/Test
   A. Consumable Materials
      (1) Lockwire
          British Spec/Ref - DTD.189A, 22 SWG
          American Spec/Ref - 21 AWG
          OMat No. 238
   B. References
      (1) AMM 24-22-00/201, Electrical Power - Control
      (2) AMM 31-41-00/201, EICAS
      (3) AMM 71-00-00/201, Power Plant
      (4) AMM 71-11-04/201, Fan Cowl Panels
      (5) FIM 75-32-00/101, Compressor Bleed Control System
      (6) AMM 75-32-00/201, Compressor Bleed Control System
   C. Access
      (1) Location Zones
          410 Left Engine
          420 Right Engine

      (2) Access Panels
          413AL Fan Cowl Panel (LH)
          423AL Fan Cowl Panel (LH)
          414AR Fan Cowl Panel (RH)
          424AR Fan Cowl Panel (RH)

   D. Do the TPU/TFV Operational Test (Engine in Operation)

          S 015-002-R00

      CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU OPEN THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

      (1) Open the fan cowl panels (AMM 71-11-04/201).

          S 865-003-R00
      (2) Supply the electrical power (AMM 24-22-00/201).

S 865-004-R00

WARNING: USE AMM 71-00-00/201 TO OPERATE THE POWER PLANT. IF YOU DO NOT USE THIS PROCEDURE, YOU CAN CAUSE DAMAGE TO EQUIPMENT OR INJURY TO PERSONS.

(3) Use the Power Plant Operation (Normal) procedure to start the engines (AMM 71-00-00/201).

S 215-023-R00

(4) Examine the EICAS Status/Maintenance pages for fault messages as follows:
   (a) Do the EICAS Status/Maintenance Message procedure to erase the fault codes (AMM 31-41-00/201).
   (b) On the EICAS maintenance panel (P61), push the ECS/MSG switch and make sure that the ECS/MSG format is shown.
   (c) Make sure that the L(R) ENG SURGE CONT or L(R) ENG SURGE BITE messages are not shown on the EICAS Status/Maintenance pages.

S 815-007-R00

(5) If the L(R) ENG SURGE CONT or the L(R) ENG SURGE BITE messages are shown, do the steps that follow:
   (a) Use the Power Plant Operation (Normal) procedure to do the engine shut-down (AMM 71-00-00/201).
   (b) Do the corrective action for the messages shown (Fault Isolation/Maintenance Manual 75 - Fault Code Index)

   WARNING: USE AMM 71-00-00/201 TO OPERATE THE POWER PLANT. IF YOU DO NOT USE THIS PROCEDURE, YOU CAN CAUSE DAMAGE TO EQUIPMENT OR INJURY TO PERSONS.

   (c) Use the Power Plant Operation (Normal) procedure to start the engine (AMM 71-00-00/201).
   (d) Do the EICAS Status/Maintenance message erase procedure (AMM 31-41-00/201).

(e) On the EICAS maintenance panel (P61), push the ECS/MSG switch and make sure that the L(R) ENG SURGE CONT or the L(R) ENG SURGE BITE messages are not shown.

S 865-008-R00

CAUTION: DO NOT MOVE THE THRUST LEVERS FROM THE IDLE POSITION DURING THE TPU TEST. FAN COWL PANEL AND ENGINE DAMAGE CAN OCCUR.

(6) Let the engine become stable at minimum idle.

S 715-009-R00

WARNING: ONLY GO NEAR THE ENGINES IN THE SPECIFIED HAZARD AREAS FOR MINIMUM IDLE POWER (AMM 71-00-00/201). IF YOU DO NOT STAY IN THESE AREAS, INJURY CAN OCCUR.

WHEN YOU DISCONNECT THE TPU FLEXIBLE TUBE CONNECTION, MAKE SURE YOU ARE CLEAR OF THE HIGH ENERGY IGNITOR BOXES AND LEADS. IF YOU DO NOT OBEY THESE INSTRUCTIONS, INJURY TO PERSONS CAN OCCUR.

CAUTION: IF N3 DROPS BELOW 36%, THIS IS INDICATIVE THAT RE-IGNITION HAS NOT OCCURRED. CUT-OFF FUEL IMMEDIATELY AS A PRECAUTION AGAINST A TURBINE EXHAUST AREA FIRE. MONITOR EGT (EGT START LIMIT IS 570 DEGREES C).

(7) While holding the TPU P4 pneumatic flexible line in place, remove the lockwire and loosen the locknut. Quickly disconnect the flexible line directing the open end away from P4 air tube. Re-install immediately (within 0.5 seconds) and re-fit locknut to hold the flexible line in place (leakage prevention) until the engine has recovered to idle and been subsequently shut down.

S 715-025-R00

(8) Verify that engine parameters decrease,(N3, etc...) the engine relights, and recovers to minimum idle.

S 215-011-R00
(9) Make sure that the L(R) ENG SURGE BITE message is shown on the lower EICAS display 10 seconds after the TPU flexible tube is disconnected. A 5 second time delay is incorporated in the EICAS message logic.

NOTE: The BVCU will stay in the transient mode and the EGT will not go back to its usual parameters until engine shutdown occurs.

S 865-005-R00
(10) Use the Power Plant Operation (Normal) procedure to do the engine shut-down (AMM 71-00-00/201).

S 215-014-R00
(11) Make sure that the TPU shows the fault code F0 40 after the engine is shutdown.

S 745-016-R00
(12) Examine the BVCU BITE as follows:
(a) Put the BVCU/EEC ground test switch, on the matrix junction block, to the BVCU position and make sure that the BVCU BITE shows F0 04.
(b) Release ground test switch and make sure the switch goes back with spring pressure to the middle off position.

S 435-017-R00
(13) Verify torque of the TPU flexible tube (125 inch pounds).
(a) Install the lockwire.

S 865-018-R00
(14) Do the EICAS Status/Maintenance Message procedure to erase the fault codes (AMM 31-41-00/201).

S 865-019-R00
(15) Remove the electrical power (AMM 24-22-00/201).

S 415-020-R00

CAUTION: OBEY THE PRECAUTIONS FOR THE KEVLAR WRAPPING WHEN YOU CLOSE THE FAN COWL PANEL. IF THE PRECAUTIONS ARE NOT OBEYED, DAMAGE TO THE KEVLAR WRAPPING CAN OCCUR.

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

P30 CONTROL VALVE - REMOVAL/INSTALLATION

1. General
   A. This procedure contains two tasks. The first task is to remove the P30 Control Valve. The second task is to install the P30 Control Valve.

TASK 75-32-19-004-001-R00

2. Remove the P30 Control Valve
   A. References
      (1) AMM 78-31-00/201, Thrust Reverser System
      (2) AMM 72-03-01/401, Compressor Fairings
   B. Access
      (1) Location Zones
          411 Left Engine
          421 Right Engine

      (2) Access Panels
          415AL Thrust Reverser, Left Engine
          416AR Thrust Reverser, Left Engine
          425AL Thrust Reverser, Right Engine
          425AR Thrust Reverser, Right Engine

   C. Prepare to Remove the P30 Control Valve

      S 844-002-R00
      (1) For the left engine, open the applicable breaker and attach a DO-NOT-OPERATE tag.

      S 844-003-R00
      (2) For the right engine, open the applicable circuit breaker and attach a DO-NOT-OPERATE tag.

      S 844-004-R00

      WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU OPEN THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS OR DAMAGE TO EQUIPMENT CAN OCCUR.

      (3) Open the thrust reversers (AMM 78-21-00/201).

      S 014-005-R00
      (4) Remove the top left and the side left compressor fairings (AMM 72-03-01/401).
   D. Procedure (Fig. 401)

      S 024-006-R00
      (1) Remove the electrical connector (3).

S 024-007-R00
(2) Remove the clip details at clip positions 2708 and 2710.

S 024-008-R00
(3) Disconnect the tube (7).

S 014-009-R00
(4) Remove the nuts (6), washers (5) and bolts (4).

S 024-010-R00
(5) Remove the P30 Control Valve (5).

S 424-011-R00
(6) Install dust caps to all openings and electrical connectors.

TASK 75-32-19-404-012-R00

3. Install the P30 Control Valve

A. Consumable Materials

(1) Lockwire
British Spec/Ref - DTD 189A, 22 SWG
American Spec/Ref - 21 AWG
Omat No. 238

(2) Jointing Compound
British Spec/Ref DTD 900/4586
American Spec/Ref ASTM D926
Omat No. 4/46

B. References

(1) AMM 70-50-12/201, Connection of Electrical Plugs
(2) AMM 72-03-01/401, Compressor Fairing
(3) AMM 78-31-00/201, Thrust Reverser System

C. Access

(1) Location Zones
411 Left Engine
421 Right Engine

(2) Access Panels
415AL Thrust Reverser, Left Engine
416AR Thrust Reverser, Left Engine
425AL Thrust Reverser, Right Engine
425AR Thrust Reverser, Right Engine

D. Procedure (Fig. 401)

S 114-014-R00

WARNING: DO NOT GET THE DEGREASING FLUID IN YOUR MOUTH OR EYES, OR ON YOUR SKIN. DO NOT BREATHE THE FUMES FROM THE DEGREASING FLUID. PUT ON PROTECTIVE SPLASH GOGGLES WHEN YOU USE THE DEGREASING FLUID. KEEP THE DEGREASING FLUID AWAY FROM SPARKS, FLAME AND HEAT. MAKE SURE THERE IS A GOOD FLOW OF AIR IN THE AREA WHERE THE DEGREASING FLUID IS USED. THE DEGREASING FLUID IS A POISONOUS AND FLAMMABLE SOLVENT WHICH CAN CAUSE INJURY TO PERSONS OR DAMAGE TO EQUIPMENT.

CAUTION: BE CAREFUL WHEN YOU USE THE DEGREASING FLUID BECAUSE SURFACE PROTECTION WILL BE REMOVED. ALL PROTECTED AREAS WHERE THE DEGREASING FLUID IS USED MUST BE PROTECTED AGAIN (AMM 70-42-12/201).

(1) Put degreasing fluid on a clean, dry, lint-free cloth intil is is moist.

NOTE: Put degreasing fluid on the cloth away from the containter to prevent contamination of the bulk liquid.

S 114-015-R00

(2) Remove the contamination from the mating surfaces with the moist cloth.

NOTE: Discard the dirty cloth after each operation and use a clean one.

S 024-016-R00

(3) Remove the dust caps from all openings and electrical connectors.

S 394-017-R00

(4) Apply jointing compound to the interface between the support panel (1) and the control valve (2).

S 424-018-R00

(5) Put the P30 control valve (2) in position and install the bolts (4), washers (5) and nuts (6).

S 424-019-R00

(6) Tighten the nuts (6) to the standard loading.

S 424-020-R00
(7) Connect the tube (7).

S 424-021-R00
(8) Tighten the tube connector to the standard loading.

S 424-022-R00
(9) Install a lockwire to the tube connector.

S 424-023-R00
(10) Install the electrical connector (3).

S 424-024-R00
(11) Install the clip details at clip positions 2708 and 2710.
(a) Tighten the clip nuts to the standard loading.

E. Put the airplane back to its Usual Condition.

S 844-025-R00
(1) Install the compressor fairings (AMM 72-03-01/401).

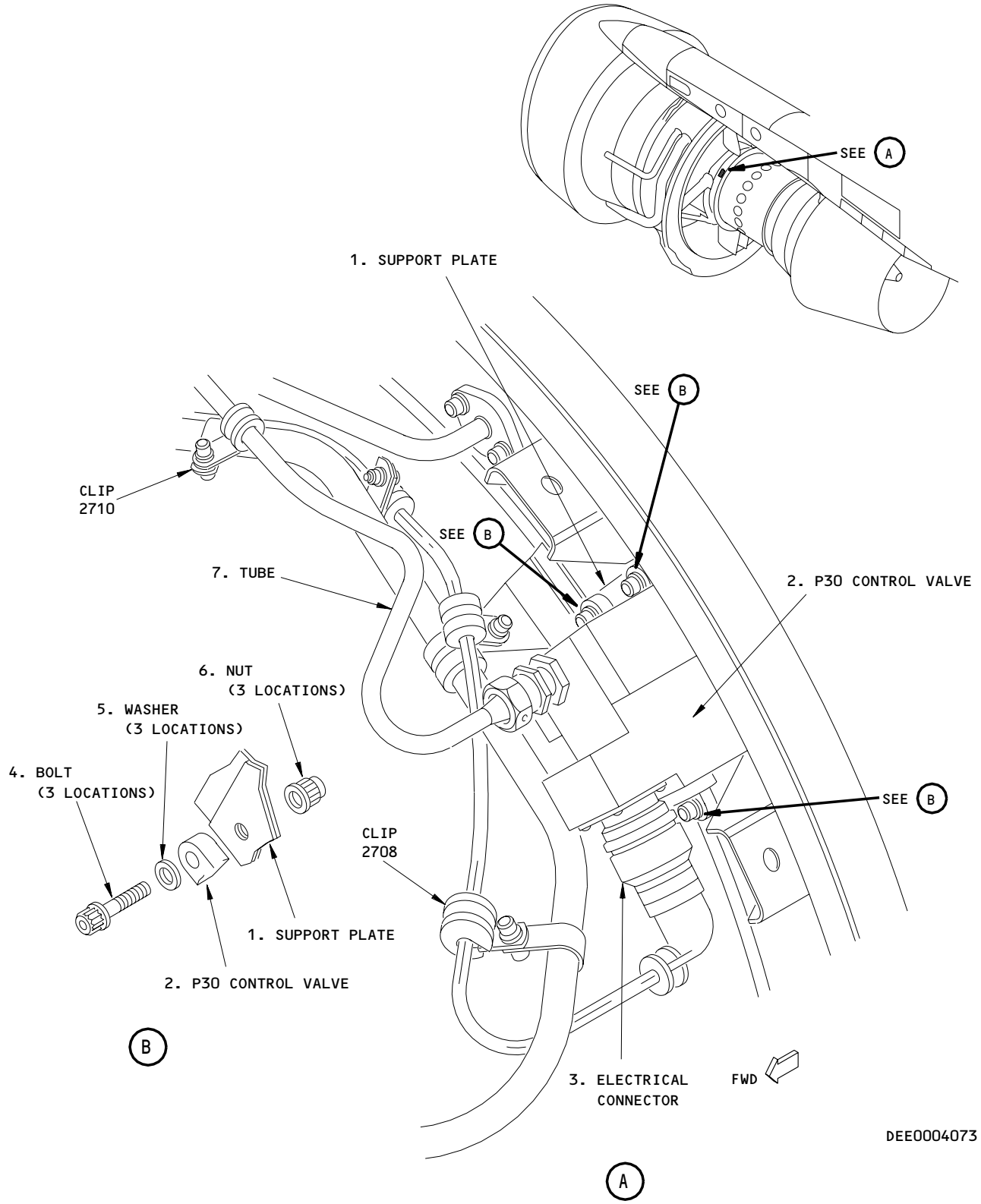
S 414-029-R00

WARNING: OBEY THE INSTRUCTIONS IN AMM 78-31-00/201 WHEN YOU CLOSE THE THRUST REVERSERS. IF YOU DO NOT OBEY THE INSTRUCTIONS, INJURY TO PERSONS CAN OCCUR.

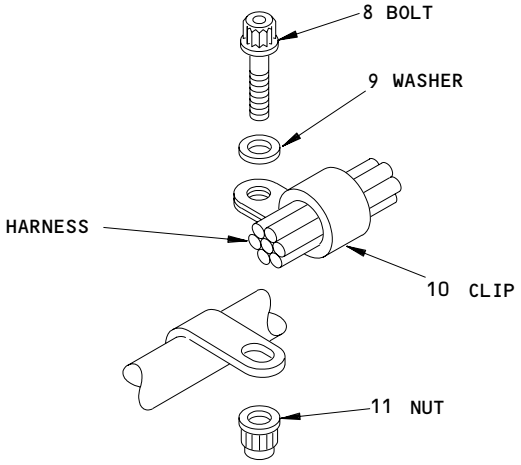
(2) Close the thrust reversers (AMM 78-31-00/201).

S 844-028-R00
(3) For the left engine, remove the DO-NOT-OPERATE tag and close the applicable circuit breaker.

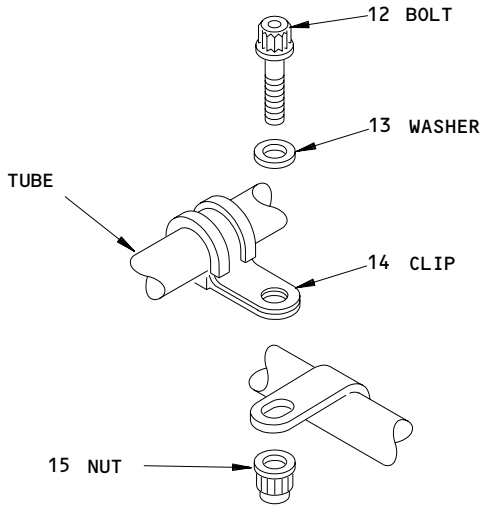
S 844-027-R00
(4) For the right engine, remove the DO-NOT-OPERATE tag and close the applicable circuit breaker.



P30 Control Valve Removal/ Installation
Figure 401 (Sheet 1)



CLIP POSITION 2708



CLIP POSITION 2710

DEE0004106

P30 Control Valve Removal/Installation
Figure 401 (Sheet 2)