DOCKET NO. SA-516

EXHIBIT NO. 11M

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

TWA MODIFICATION ORDER 72F57

(PAGES M-1 THRU M-11)

COPIES:

DEPT	M.O.	INSTL DWG	FAB DWG
PRD CTL			
TOOLING			
PURCHG			
NEED			

AD - FAR
TWA
MODIFICATION ORDER

~~MMO/~~
~~SMG/~~
M.O. NUMBER 72F57
DATE 4/1/96
ATA 28-20
PAGE 1 OF 11 PAGES

CHARGE TO APPROVED MASTER MODIFICATION ORDER NO. THIS PAGE REPLACES PAGE DATED

TITLE
FUEL BOOST & OVERRIDE/JETTISON PUMP INSULATION RESISTANCE CHECK

AIRCRAFT AFFECTED
ENGINES AFFECTED
747 All - See Pg 2

TOTAL QUANTITY	AIRCRAFT	ENGINES	UNITS
MODIFIED	11		
INSPECTED			

MODULE: 1 2 3 4 5 6 7 8

ENGINEER J. C. Gieritz DATE 4/1/96
MANAGER ENGINEERING M. G. Raub DATE 4/4/96
DIR/PROJ. COORD. - ENGINEERING D. G. Kirkpatrick DATE 4-9-96
Sr. V.P. - ENGINEERING DATE N/12
CONTROLLER DATE

[X] SCHEDULE REPAIR [X] BASE OVERHAUL
[X] SHOP OVERHAUL [ ] UNSCHEDULED REPAIR
[ ] PRE-SERVICE [X] OTHER
[X] CHECK "C" [ ] LAYOVER

CLASSIFICATION [ ] MAJOR [X] MINOR
F.A.A. APRVL REQ'D [ ] YES [ ] NO [X] COPY TO F.A.A.
F.A.A. LIAISON (TWA) R A Ruellia
F.A.A. REPRESENTATIVE

TWA COST SUMMARY (SEE COST PAGES FOR DETAIL)

TOTAL DIRECT COSTS	TOTAL RELATED COSTS	TOTAL COST
$11,188.	$0.00	$11,188.

FINANCIAL USE ONLY

TOTAL OBSOLESCENCE
Sr. V.P. - MAINT. & ENGINEERING DATE

OVERHEAD	TOTAL COSTS	COST PER UNIT
	11,188.00	1,017.00

[X] EXPENSE	[ ] CAPITAL	[ ] BILLABLE	CODE	REVIEWED BY/DATE	COST CTR	ACCOUNT
			12	4-11-96 V. Logambill	711	1426-2

ENGINEER NONE WEIGHT & BALANCE DATA NONE S.T.C. REQ'D NONE FLT OPS INFO NONE

A. REFERENCE:

Boeing Alert Service Bulletin 747-28A2194, dated August 3, 1995.
Boeing Telex M-7240-95-1171, dated August 4, 1995.
Boeing Telex M-7240-95-1881, dated December 12, 1995.
Boeing Telec M-7240-96-0576, dated March 21, 1996.
ATA Wire 3/18/96C

B. DESCRIPTION:

This modification order directs the initial inspection of 747 fuel pumps for leaks at the fuel pump/wire bundle interface and test the insulation resistance of the pump wiring.

C. JUSTIFICATION: (Priority 1) Pending Airworthiness Directive

Boeing Alert S.B. 747-28A2194 informs operators of the possibility of corrosion developing in the pump wire terminal assembly. This can lead to arcing within the terminal assembly which might lead to failure of the pump and a fuel leak.

D. RELATED INFORMATION:

None.

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mmto CF 4-3-96

REVISED PAGES ONLY:
CRAFT FLEET 747

TYPED jg DATE 4/1/94 PAGE 2
THIS PAGE REPLACES PAGE DATED _____

SUBJECT: FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION	M.O. NO. 72F57
ENGINEER J. C. Giertz	MANAGER M. G. Raub

AFFECTED AIRCRAFT:

NOTE: THIS FORM WILL ONLY BE INFREQUENTLY REVISED, SO REFER TO AS&P 7-10-07 WHCH IS THE OFFICIAL LISTING OF AIRCRAFT TO BE COVERED BY MO'S AND INCLUDES AIRCRAFT LEASED TO OTHERS AS WELL AS PARKED AIRCRAFT.

727		747	767	L-1011		DC9		MD80	
-231	-231A	-131	-231	-1	-10(-15)	-32	-41	-82	-83
4308	4338	17104	16001	11003	8169	8220	8433	9001	9301
4309	4339	17107	16002	11004	8170	8221	8434	9002	9302
4310	4340	17108	16003	11005	8171	8222	8435	9003	9303
4311	4341	17109	16005	11006	8173	8223		9004	9304
4312	4342	17110	16006	11008	8175	8224	-51	9005	9305
4313	4343	17116	16007	11013	8190	8225	8905	9006	9306
4314	4344	17119	16008	11014	8191	8226	8906	9007	9307
4315	4345		16009	11016		8229	8908	9008	
4319	4346	-156A	16010	11017	-31	8231	8909	9009	-83
4320	4347	17133			8376	8232	8910	9011	9401
4322	4348	17134	-205	-50	8377	8295	8911	9012	9402
4325	4349		16050	21019	8378	8296	8912	9013	9403
4326	4350	-257B/284B	16051	21023	8379	8297	8914	9014	9404
4327	4351	17303		21027	8380	8298	8915	9015	9405
4329	4352	17305	-3Y0		8381		8916	9016	9406
4330	4353		16101	-100	8382	-33CF	8917	9017	9407
4331	4354		16102	31029	8383	8537	8918	9018	9408
4332	4355			31031	8384			9019	9409
4333	4357		-330	31036	8385	-34		9020	9410
4334			16103		8386	8627		9050	9411
4335					8387	8628		9051	9412
4336					8388	8636		9052	9413
4337					8389			9053	9414
					8390			9054	
					8391			9055	
					8392			9056	
					8393			9057	
								9058	
								9059	

SHADED A/C NUMBERS ARE NOT APPLICABLE FOR THIS MODIFICATION ORDER

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OR REVISED PAGES ONLY:
IRCRAFT FLEET 747
O. OF COPIES PRODUCTION CONTROL:
I.O. ___ FAB.DWG. ___ INSTL.DWG. ___

TYPED jg DATE 4/1/96 PAGE 3
THIS PAGE REPLACES PAGE DATED ____

ITLE
FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION

M.O. NO.
72F57

NGINEER J. C. Giertz MANAGER M. G. Raub

MODIFICATION INSTRUCTIONS:

Part One: Inspect Spare Fuel Pumps

1. On each pump, do a visual inspection of the pump wire terminal assembly. Look for these conditions:

   a. Signs that fuel has leaked from the wire terminal assembly.

   b. Signs that the terminal assembly or wire insulation is discolored because of too much heat. Clean the cap as specified in the SWPM 20-60-01.

   c. Signs of damage to the wire terminal assembly like bulges, bent flanges, broken screws, corrosion, etc.

   d. If any of the above conditions can be seen, replace/repair as necessary, then go to step 2. If pump checks ok, go to step 2.

2. Do these steps on each pump using a megohmmeter, TWA S/N R&R 90014, TWA Spec. No. EQ 249:

   a. Set megohmmeter to 10 VDC.
   NOTE: This step is conducted at 10 VDC to prevent arcing or overheating in a flammable leakage zone when high voltage is applied to a pump with low insulation resistance.

   b. Measure the resistance between pin 4 and any of pins 1, 2 or 3 of the pump mounted electrical connector (see Figure 1). Record the resistance on the data sheet, Table 1.
   NOTE: Make sure the resistance is equal to or greater than 1 megohm; if the resistance is greater than 1 megohm, go to step 2c; if the resistance is less than 1 megohm, replace/repair as necessary, then repeat step 2. If pump checks ok, proceed to following instructions.

TITLE
FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION

M.O. NO.
72F57

ENGINEER J. C. Giertz MANAGER M. G. Raub

E. MODIFICATION INSTRUCTIONS: continued

Part One: Inspect Spare Fuel Pumps

2. continued

c. Set the megohmmeter to 500 VDC

d. Measure the resistance between pin 4 and any of pins 1, 2 or 3 of the pump mounted electrical connector (see Figure 1). Record the resistance on the data sheet, Table 1.
NOTE: Make sure the resistance is equal to or greater than 5 megohms; if the resistance is greater than 5 megohms, return unit to stock; if the resistance is less than 5 megohms, replace/repair as necessary, then repeat step 2. If pump checks ok, return unit to spare stock.

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ITLE
FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION

M.O. NO.
72F57

ENGINEER J. C. Giertz MANAGER M. G. Raub

3. MODIFICATION INSTRUCTIONS: continued

Part Two: Inspect Fuel Pumps on Aircraft

1. Ensure that the airplane is in an area which permits air to circulate freely.

2. Ensure that fire fighting equipment is available near the test location.

3. Ensure that the airplane is grounded correctly. Refer to the 747 MM 20-41-01, Static Ground Procedure.

4. Ensure that all work stands are grounded correctly. Refer to the 747 MM 20-41-01, Static Ground Procedure.

5. Get access to the airplane fuel pumps. For boost pumps (8 each) reference 747 MM 28-22-03, and for jettison/override pumps (6 each) reference 28-31-01. In the applicable MM subjects, do the steps necessary to get access to the fuel pump electric motor.

6. Open the circuit breaker for one fuel pump and attach a DO-NOT-CLOSE tag. See step 5 for MM references to get circuit breaker data.

7. On each pump, do a visual inspection of the pump wire terminal assembly. Look for these conditions:

   a. Signs that fuel has leaked from the wire terminal assembly.

   b. Signs that the terminal assembly or wire insulation is discolored because of too much heat. Clean the cap as specified in the SWPM 20-60-01.

   c. Signs of damage to the wire terminal assembly like bulges, bent flanges, broken screws, corrosion, etc.

   d. If any of the above conditions can be seen, replace the pump, then go to step 6. Refer to step 5 for MM references to remove/install the fuel pump. If pump checks ok, go to step 8.

TITLE
FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION

M.O. NO.
72F57

ENGINEER J. C. Giertz MANAGER M. G. Raub

E. MODIFICATION INSTRUCTIONS: continued

Part Two: Inspect Fuel Pumps on Aircraft

8. Do these steps on each pump using a megohmmeter, TWA S/N R&R 90014, TWA Spec. No. EQ 249:

   a. Disconnect pump's electrical connector.

   b. Set megohmmeter to 10 VDC.
   NOTE: This step is conducted at 10 VDC to prevent arcing or overheating in a flammable leakage zone when high voltage is applied to a pump with low insulation resistance.

   c. Measure the resistance between pin 4 and any of pins 1, 2 or 3 of the pump mounted electrical connector (see Figure 1). Record the resistance on the data sheet, Table 1.
   NOTE: Make sure the resistance is equal to or greater than 1 megohm; if the resistance is greater than 1 megohm, go to step 8d; if the resistance is less than 1 megohm, replace pump and return to step 6.

   d. Set the megohmmeter to 500 VDC

   e. Measure the resistance between pin 4 and any of pins 1, 2 or 3 of the pump mounted electrical connector (see Figure 1). Record the resistance on the data sheet, Table 1.
   NOTE: Make sure the resistance is equal to or greater than 5 megohms; if the resistance is greater than 5 megohms, go to step 8f; if the resistance is less than 5 megohms, replace pump and return to step 6.

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TITLE
FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION

M.O. NO.
72F57

ENGINEER J. C. Giertz MANAGER M. G. Raub

3. MODIFICATION INSTRUCTIONS: continued

Part Two: Inspect Fuel Pumps on Aircraft

9. After pump passes all previous steps, go to step 6 for next fuel pump.

   a. #1 main fwd boost pump
   b. #1 main aft boost pump
   c. #2 main fwd boost pump
   d. #2 main aft boost pump
   e. #2 main outboard ovrd/jettison pump
   f. #2 main inboard ovrd/jettison pump
   g. center wing tank left ovrd/jettison pump
   h. center wing tank right ovrd/jettison pump
   i. center wing tank scavenge pump
   j. #3 main fwd boost pump
   k. #3 main aft boost pump
   l. #3 main outboard ovrd/jettison pump
   m. #3 main inboard ovrd/jettison pump
   j. #4 main fwd boost pump
   k. #4 main aft boost pump

10. Close the circuit breakers opened in step 6 and remove the DO-NOT-CLOSE tags.

11. Return aircraft to serviceable condition per all applicable 747 MM references.

12. Return removed units to MCI, Building 2 Accessory Shop, C/C 644, Col 909.

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TITLE M.O. NO.
FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION 72F57

ENGINEER J. C. Giertz MANAGER M. G. Raub

747 FUEL PUMP INSPECTION DATA SHEET

AIRPLANE TAIL NBR:	HRS/CYCLES:	DATE:

PUMP LOCATION	INSTALLED PUMP			RESISTENCE IN MEGOHMS		NEW PUMP (IF NECESSARY)	
	PART NBR	SERIAL NBR	TSO/TSN OVHL/NEW	10 VDC	500 VDC	PART NBR	SERIAL NBR
NBR 1 MAIN FWD BOOST PUMP							
NBR 1 MAIN AFT BOOST PUMP							
NBR 2 MAIN FWD BOOST PUMP							
NBR 2 MAIN AFT BOOST PUMP							
NBR 2 MAIN OUTBOARD OVRD/JETTISON PUMP							
NBR 2 MAIN INBOARD OVRD/JETTISON PUMP							
CTR WING TANK LEFT OVRD/JETTISON PUMP							
CTR WING TANK RIGHT OVRD/JETTISON PUMP							
CTR TANK SCAVENGE PUMP							
NBR 3 MAIN FWD BOOST PUMP							
NBR 3 MAIN AFT BOOST PUMP							
NBR 3 MAIN OUTBOARD OVRD/JETTISON PUMP							
NBR 3 MAIN INBOARD OVRD/JETTISON PUMP							
NBR 4 MAIN FWD BOOST PUMP							
NBR 4 MAIN AFT BOOST PUMP							

TABLE 1 - PUMP INSPECTION SUMMARY

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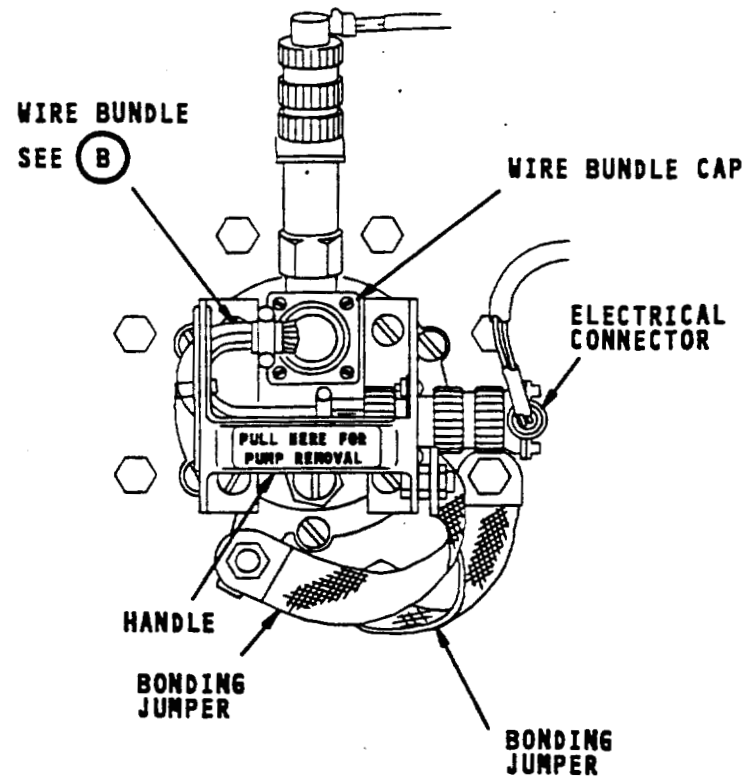
TLE
FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION

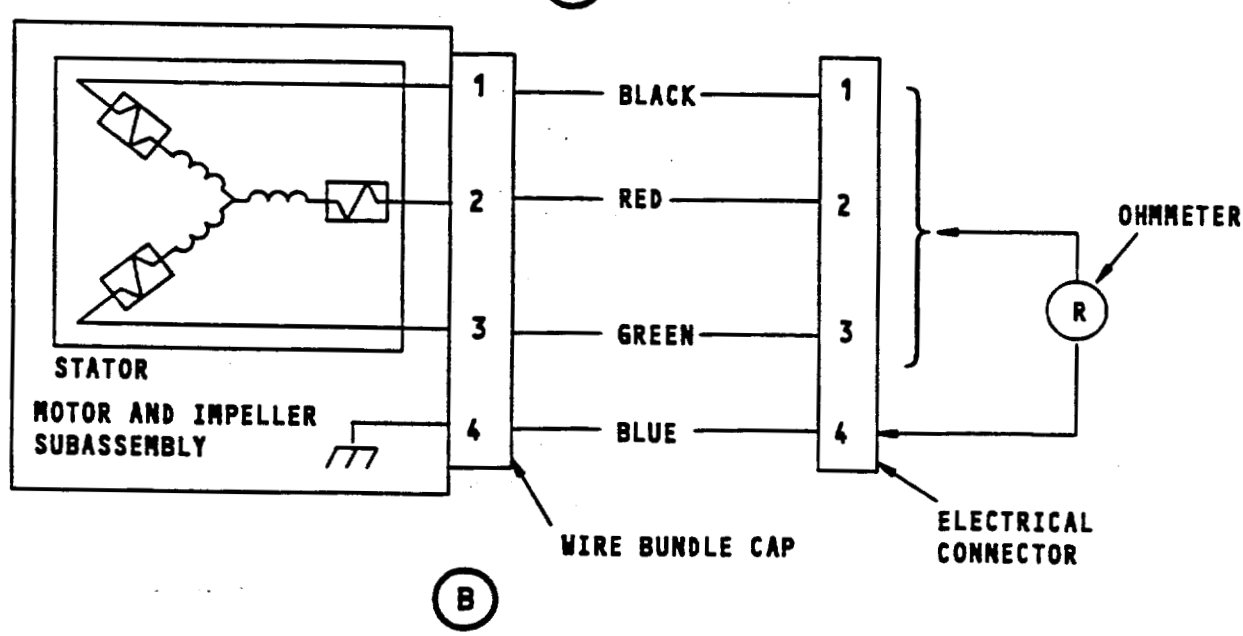
M.O. NO.
72F57

ENGINEER J. C. Giertz MANAGER M. G. Raub



TYPICAL

A



B

FIGURE 1

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ITLE
FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION

M.O. NO.
72F57

NGINEER J. C. Giertz MANAGER M. G. Raub

. MODIFICATION KIT LIST:

Item	Mfr. Code	Mfr. P/N	TWA S/N	SPS No.	Nomenclature	Qty/Plane
1.	04237	2101A	90014		Megohmmeter - Test Set	1*

One test set must be available at each scheduled station to perform inspection.

. DRAWINGS REQUIRED:

Drawing No.	Sheet	Change	Type	Source	Title

None

H. PARTS REMOVED:

___) Mfr. Old P/N	Nomenclature	Qty/Pln	Replaced Mfr. New P/N	Obsolete	Disposition of Part

None

. SPECIAL OR ADDITIONAL TOOLS AND EQUIPMENT:

K. SPECIAL INSTRUCTIONS TO GROUND OPERATIONS FUNCTIONS:

L. SPECIAL INFORMATION FOR OTHER DEPARTMENTS:

M. MANUAL, JOB METHOD AND OVERHAUL SPECIFICATION INFORMATION:

1. An MSL is not required.
2. Airplane Maintenance Manual revision is not required.
3. Airplane Wiring Diagram change is not required.
4. Component Maintenance Manual revision is not required.
5. Technical Information Support should not request new component maintenance manual or revision to existing manual from vendor.
6. Technical Information Support is not required to forward M.O. for customized Airframe IPC incorporation, or otherwise make IPC revision.
7. An Aircraft Electrical Load change is not being made.
8. Operational Specifications are not affected.
9. Fault Isolation Reporting Method/Fault Reporting Method/Malfunction Reporting System (FIRM/FRM/MRS) is not affected.

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TLE
FUEL BOOST AND OVERRIDE/JETTISON PUMP INSPECTION

M.O. NO.
72F57

NGINEER J. C. Giertz MANAGER M. G. Raub Production Estimator Supervisor T. McKinney

1. LABOR BREAKDOWN

LABOR SPECIALTY	BLDG 1 SHOP (TOTAL MAN HRS.)	BLDG 2 SHOP (TOTAL MAN HRS.)	MCI HANGAR (MAN HRS. PER AIRCRAFT/UNIT)	FIELD
Avionics				16
Aircraft				8
TOTAL MAN HRS:			TOTAL:	24
			No. of ACFT/Units:	11
			No. of Eng.(if app):	
			TOTAL MAN HRS:	264

TOTAL SHOP MAN HOURS: ____ TOTAL HANGAR & FIELD MAN HRS: ____
HOURLY LABOR RATE: $ ____ HOURLY LABOR RATE: $ 42.38
TAL SHOP LABOR COST: $ ____ TOTAL HANGAR/FIELD LABOR COST: $ 11,188.32

OVERHEAD	$ 0	MANHOURS PER A/C /UNIT	24
TOTAL MOD. LABOR COST:	$ 11,188.32	MATERIAL COST PER A/C	$ 0.

2. COST ANALYSIS

A. DIRECT COSTS
(1) LABOR (INCLUDING OVERHEAD) $ 11,188.32
(2) MATERIAL/TOOLS/EQPT. CONSUMED
(a) MATERIAL INSTALLED:
CAPITAL $ ____
EXPENSE $ ____
SUB-TOTAL $ ____
(b) TOOLS/EQPT. CONSUMED $ ____
SUB-TOTAL
MAT'L/TOOLS/EQPT $ ____
(3) SERVICES PURCHASED
____ $ ____
(VENDOR)
GROSS LBR/MAT'L/SVC PUR $ ____
(4) LESS KNOWN CRS (SEE $E_{(2)}$) $
TOTAL DIRECT COSTS $ ____

B. RELATED SUPPORT COSTS
(1) SPARE PARTS/MATERIAL
CAPITAL (FLT EQPT. R & R) $ ____
EXPENDABLE INV. STOCK $ ____
SUB-TOTAL $ ____
(2) MAINT/O'HAUL SUPPORT TOOLING/EQPT
CAPITAL $ ____
EXPENSE $ ____
SUB-TOTAL $ ____
TOTAL RELATED SUPPORT COST $ ____

TOTAL COST $ 11,188.32

C. SPECIAL PROJECT STOCK KIT COST:
(DO NOT USE IF TOTAL MATERIAL COST IS > $1,000)
MATERIAL INSTALLED $ ____
NUMBER OF AIRCRAFT UNITS MODIFIED
MATERIAL COST PER KIT $ ____

D. TOTAL ENGRG MAN HOURS ____

E. OTHER COST FACTORS (EXPLAIN)
(1) OBSOLESCENCE $ ____
(a) SHELF $ ____
(b) PIPELINE $ ____
(2) CREDITS $ ____

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