To Doug Twinham	From B.T. Stewart
Co.	Dept. / Sta. 563/ATL
Dept. / Sta.	Phone # 4-1096
Fax # 5-1165	Fax # 4-3304

0412-20354 Sticker 7/92

Barry

FILE CODE: 32-40
March 17, 1993

TO: Supervisor - FAA/NTSB Liaison

FROM: Manager - Mechanical Engineering

SUBJECT: Condition of Wheels, Brakes and Tires removed from Ship 678

Per your request, the following describes the condition of the wheels, brakes, and tires removed from ship 678 after landing in FLL.

Wheels and Tires

The two wheel/tire assemblies removed from the inboard side of the right-hand main landing gear (positions 3 and 7) showed signs of being overheated. Much of the tread and sidewall were discolored and there was some melting of the rubber where it came in contact with the wheel. In addition, the thermal fuse plugs in both wheels were blown.

The two wheel/tire assemblies removed from the outboard side of the right-hand main landing gear (positions 4 and 8) had skidded completely through the carcass, resulting in a blowout. There are no signs of excessive heat soak into the wheel or tire.

Brakes

All four brakes were removed from the right-hand main landing gear (positions 3, 4, 7, and 8). The brake removed from position 7 showed signs of overheating, as evidenced by the bulged pistons and accelerated oxidation on the pressure plate. One of the pistons had ruptured. In addition, one of the disk drive blocks had fractured and separated from the carbon disk. The bulged pistons were most likely caused by softening of the metal due to heat soak from the carbon disks into the brake head. The brake removed from position 3 also showed signs of excessive heat, although no pistons were bulged. Brakes removed from positions 4 and 8 showed no signs of excessive heat or any abnormalities.

After initial examination of the wheels, brakes, and tires, Engineering believes the skidded tires had locked up sometime during the landing, due to anti-skid system failure possibly due to electrical power loss which occurred upon contact with the runway. The other two tires on the right-hand main landing gear were then required to support all weight and braking loads, thus causing the overheat condition. The bulged pistons most likely occurred after the landing, and were the result of heat soak into a pressurized brake.

The wheels brakes and tires are currently on hold in Dept. 391 and await your word to begin teardown and further investigation. Should you have any questions, please do not hesitate to contact me.

Original signed by:
Joseph C. Kilpatrick

Joseph C. Kilpatrick

JUL 30 1993

JCK/BTS:wc

filename: Ship678

FOLLOW UP ON WHEELS & BRAKE SEE PG. 3 Joe 5/3

[redacted]

DATE: May 3, 1993

TO: Staff Manager - Aircraft Maintenance - Shops

FROM: Technical Analyst - Component Shops DBD

SUBJECT: Report on A/C 678: Findings of Wheels and Brakes

As per your request, I have reviewed the shop findings of the tires, wheels and brakes removed from aircraft 678, right main landing gear on February 23, 1993, in FLL. After detailed disassembly, inspection and analysis of these findings in Department 391 - Wheel and Brake Shop, Maintenance believes the follows events took place upon landing:

> Upon landing, the two outboard tires (positions #4 & #8) locked up possibly due to anti-skid system failure caused by the possible momentary loss of electric power as a result of the hard landing. The two outboard tires skidded through the casings and blew as a result. The two inboard tires (positions #3 & #7) then were required to provide all braking from the right main landing gear as well as support of the aircraft. During the landing roll-out, excessive heat built up in the two inboard brake assemblies resulting in an overheat condition. The two inboard wheel and brake assemblies suffered extensive heat damage caused by heat soak into the pressurized brakes after stopping the aircraft. The two outboard brakes suffered no damage. The status of the Anti - Skid and Auto - Brake systems is not indicated in the flight data recorder information supplied to Delta's Performance Engineering by the NTSB.

A detailed summary of the shop findings is attached for your review.

[redacted]

David DeSantis

Attachments:
Shop Findings Summary
Figure A

cc: General Foreman - Aircraft Maintenance Support - Shops
Foreman - Department 391 - Wheel & Brake Shop

Aircraft 678 Shop Findings Summary

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The following is a detailed breakdown of the shop findings.

The right main landing gear positions are numbered as follows:

# 3 - Forward Inboard	# 4 - Forward Outboard
# 7 - Rear Inboard	# 8 - Rear Outboard

3 - Forward Inboard: Vendor S/N - QB 070 DAL S/N - DL 842

Tire:
* Received in shop flat due to melting of the thermal fuse plugs that melt at 390 degrees Fahrenheit (3 each per inner wheel half)
* Shows signs of overheat by discoloration of sidewall and tread, also by some melting of the rubber where it contacts the wheel

Wheel Assembly:
* Shows signs of overheat by discoloration of finish
* Thermal fuse plug melted due to overheat
* Both wheel halves failed NDT hardness tests as a result of overheat (scrapped)

Brake Assembly:
* Shows signs of excessive heat build-up in all brake assembly components (Ref. Figure A)
* Torque tube discolored and warped (scrapped)
* Heat shields delaminated (burned)
* Spreader plate warped by excessive heat and failed NDT eddy current test (scrapped)
* No pistons damaged in brake housing assembly
* No torque plate (brake housing) damage per NDT
* Temp sensor tested and returned to service

Aircraft 678 Shop Findings Summary

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7 - Rear Inboard: Vendor S/N - QB 061
DAL S/N - 840

Tire:
* Received in shop flat due to melting of the thermal fuse plugs that melt at 390 degrees Fahrenheit (3 each per inner wheel half)
* Shows signs of overheat by discoloration of sidewall and tread, also by some melting of the rubber where it contacts the wheel

Wheel:
* Shows signs of overheat by discoloration of finish
* Thermal fuse plug melted due to overheat
* Both wheel halves failed NDT hardness tests as a result of overheat (scrapped)

Brake Assembly:
* Shows signs of excessive heat build-up in all brake assembly components (Ref. Figure A)
* Torque tube discolored and warped (scrapped)
* Heat shields delaminated (burned)
* Pistons bulged in all seven positions in brake housing, #3 piston ruptured due to internal pressure build-up (Ref. below & Figure A-A)

I HAVE NEVER SEEN THIS BEFORE. THE HOLE LOOKED LIKE A RUPTURED BLISTER.
5/3

Piston diameters at largest point:
(all measurements taken starting at quick disconnect fitting proceeding clockwise, Max. allowable diameter: 1.373 in.)
Piston #1 - 1.401
#2 - 1.514
#3 - 1.985 Hole blown in side
#4 - 1.525
#5 - 1.467
#6 - 1.428
#7 - 1.382

* Spreader plate warped by excessive heat and failed NDT eddy current test (scrapped)
* No torque plate (brake housing) damage per NDT
* Temp sensor tested and returned to service

Aircraft 678 Shop Findings Summary

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 # 4 - Forward Outboard: Vendor S/N - QB069
DAL S/N - 843

Tire:
* Skidded through casing and blown

Wheel:
* No damage found to wheel assembly
* Tested and returned to service

Brake Assembly:
* No damage found to brake assembly
* Temp sensor tested and returned to service
* Restored, tested and returned to service

 # 8 - Rear Outboard: Vendor S/N - QB063
DAL S/N - 841

Tire:
* Skidded through casing and blown

Wheel:
* No damage found to wheel assembly
* Tested and returned to service

Brake Assembly:
* No damage found to brake assembly
* Temp sensor tested and returned to service

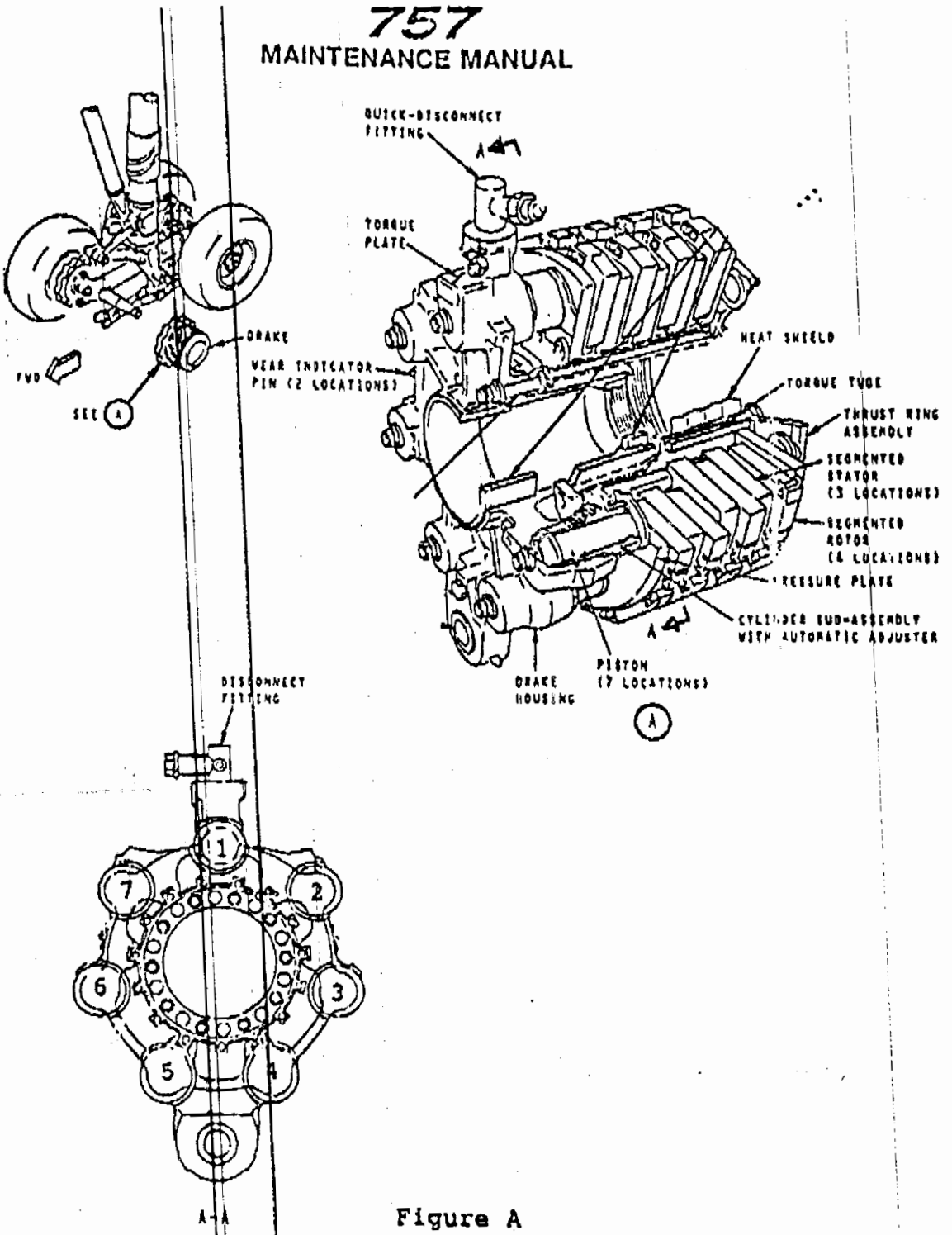

Figure A
Hydraulic Brake Assembly

AWABS-3 RWS MSG FOR FLL FLT-1086/23FEB SH- 678-D 1541Z/23FEB
LOAD PLANNER - R-WILLIAMS EXT - 8009 POS - BA
DOWNLINE STNS- ATL
FLIGHT ORIGINATES - FLL LOCAL ETD 1050 GMT ETD 1550
PLANNED LOAD BREAKDOWN NBR 1
THRU PSGRS ORIG
LOCAL PSGRS 32/200 ATL 32/200
TOTAL PSGRS 32/200 CAPACITY 26/156
LOCAL CARGO 10847 BAGS 302/07097 EST CARGO 03750
TOTAL CARGO 10847
MIN/MAX IN BINS 1 AND 2 PREF 2340/6187 LIMITS 798/8848
MAX CARGO AS BOOKED 21710 MAX CARGO WITH FULL PSGRS 21710
END OF RAMP WORKSHEET

QU FLLFMDL FLLRRDL ATLFMDL ATLRRDL
.FLLOODL 231610
FDM
FLL 1086/23 PLND 1115
TPS.25 PSGR BRDG
231611
RES 9880

FUEL DISTRIBUTION ADVISORY MESSAGE NUMBER 1
FLT-1086/23 FLL-ATL SH- 678-D 1313Z/23FEB
LOAD PLANNER - R-WILLIAMS EXT - 8009 POS- BA
----- FUEL DISTRIBUTION -----

TANK ID	TANK WGT
LM-	11500
RM-	11500
CA-	0
TTL FUEL	23000

FUEL REMARKS
** FOB ** PLZ VERIFY BEFORE HOOK-UP. IF LOAD IS LESS THAN
PLANNED OR OVER 3000 LBS MORE - NOTIFY AGENT IN CHARGE

END OF FUEL DISTRIBUTION ADVISORY MESSAGE

THIS FORM MAY BE USED WHEN AUTHORIZED BY STANDARD PRACTICE REVISION OR OTHER APPROVED DOCUMENTATION

FUEL SERVICE RECORD	STATION:	FLIGHT NO.	DESTINATION:	SHIP NO.	DATE:	DELTA AGENT:
DELTA	FLL	1086	ATL	678	2-23-93	Leis

0412-81151
RECORD 8-92

AIRCRAFT TYPE: B-757

FUEL TYPE: ☒ JET A ☐ OTHER_____ (SPECIFY) ☐ JET A-1

AIRCRAFT TANK SYSTEM	OPERATIVE GAUGE ENTRIES: AFTER SERVICING — DESIRED GAUGE	OPERATIVE GAUGE ENTRIES: AFTER SERVICING — ACTUAL GAUGE	OPERATIVE GAUGE ENTRIES: PRIOR TO SERVICING — ARRIVAL FUEL
L	115000	117000	11700
R	115000	117000	11700
C	0		

INOPERATIVE GAUGE READINGS	PRE-SERVICE		AFTER SERVICING			
	STICK NO. USED	ACTUAL READING	STICK NO. USED	DESIRED READING	STICK NO. USED	ACTUAL READING

DELTA AIR LINES

# Of Pages = 1	
To R. ORR	From A. ROMAN
Co. DL. ATL	Dept. / Sta. 110 - FLL
Dept. / Sta.	Phone # 359-1721
Fax # 404-715-1725	Fax # 305-359-7818

0412-20254 Sticker 7/92

IF STICKS ARE USED COMPLETE THE FOLLOWING	
PRE-SERVICE: PITCH =	ROLL =
AFTER SERVICE: PITCH =	ROLL =
INOP GAUGE FUELING METHOD USED:	
AGENT VERIFYING STICKS:	

230000	TOTAL DISPATCH POUNDS
23400	TOTAL POUNDS

TOTAL ACTUAL POUNDS ON BOARD		23400
SUBTRACT TOTAL POUNDS ON ARRIVAL	−	23400
EQUALS POUNDS ADDED	=	0
DIVIDED BY ACTUAL FUEL DENSITY LBS/GAL (USE 6.7 IF NOT AVAILABLE)	÷	6.72
EQUALS CALCULATED GALLONS ADDED	=	
SUBTRACT TOTAL GALLONS PUMPED	−	
EQUALS DIFFERENCE	=	
ALLOWABLE DIFFERENCE (TOLERANCE)	±	

REMARKS: ESTD F.O.B.

FUEL BOARDED PER SERVICING VEHICLE METER(S)		
GALLONS PUMPED	WING	VEHICLE NO.
	LEFT	
	RIGHT	
FOS	FUELING AGENT	

(NOTE: LITERS x 0.26417 = U.S. GALLONS)

FLEET	FUELING TOLERANCE	SP REFERENCE
DC-9	+/- 150 GALLONS	SP 3589
MD-88	+/- 150 GALLONS	SP 3584
B-727	+/- 150 GALLONS	SP 3592
B-737	+/- 150 GALLONS	SP 3588
B-757	+/- 200 GALLONS	SP 3582
B-767	+/- 250 GALLONS	SP 3587
A-310	+/- 250 GALLONS	SP 3581
L-1011	+/- 4% OF CALC. GALS	SP 3583
MD-11	+/- 4% OF CALC. GALS	SP 3585

COPY: WHITE YELLOW PINK

COPY FROM 031D3B 23FEB/1054

23FEB1547OP B18313
WDR TRANSMITTED TO B13304 -SMRS

FLT 1086/23 FLL-ATL 3142 LD PLNR R-WILLIAMS 4B1514
FINAL WEIGHT DATA RECORD DATE/TIME 23FEB 1547Z
GATE B5 - SMRS

130350 OEW 757 SHIP 678 INCLUDES 6 FLT ATT W/BAGS

1000 ADD ON UP TO 4 PSGRS AND 320 LB

4420 26 FC
26520 156 YC
195 1 JS

0 B1 CARGO
3750 B2 CARGO
4442 B3 CARGO
470 B4 CARGO

171147 ZERO FUEL WEIGHT MAX 184000
171123.6 ADJUSTED ZFW 23.3 PCT MAC ZFW

23402 FUEL/LM- 11701/RM- 11701/CA- 0
-350 LESS TAXI FUEL

194199 ACTUAL TAKEOFF WEIGHT AI 49 25.4 PCT MAC

****
194225.4 ADJUSTED TAKEOFF WEIGHT FLL TAKEOFF WEATHER /NWS
TEMP 71F ALT 29.94
WIND 334/ 6 KTS

210680 MAX TAKEOFF WT THIS FLIGHT
LIMITED BY MAX STRUCT LANDING WT

MAX T/O WT LDG ATL MAX LDG WT BURNOFF 12680 FCST 49 F
210680 FLAP 30 198000

223800 MAX STRUCTURAL TAKEOFF WEIGHT
****
FLL RWY 9L / 9001 FT 71F/ 22C 3TW 5XW
STANDARD PROFILE

RWY COND	THRUST/FLAP	PERF LIM	RATOW	STAB	V1	VR	V2
*DRY *	*AT02/15*	*194752 TW 03	194752*	3.8*	133	136	139*
*DRY *	*AT01/15*	*195260 TW 10	195260*	3.8*	131	134	139*
*DRY *	* TO/15*	*216522 TW 10	216522*	3.8*	127	133	138*
SLWET	TO/15	206554 TW 10	206554	3.8	120	133	138
ICY	TO/15	199254 TW 10	199254	3.8	108	133	138
25CTR	TO/15	195819 TW 06	195819	3.8	114	133	138
50CTR	TO/15	OVERWT	OVERWT	---	---	---	---