National Transportation Safety Board
Aviation Incident Final Report

Location:	MINNEAPOLIS, MN	**Incident Number:**	CHI89IA083
Date & Time:	05/02/1989, 1440 CDT	**Registration:**	N434AA
Aircraft:	MCDONNELL DOUGLAS DC-9-82	**Aircraft Damage:**	Minor
Defining Event:		**Injuries:**	96 None
Flight Conducted Under:	Part 121: Air Carrier - Scheduled		

Analysis

THE FLIGHT CREW REPORTED THAT WHILE IN CRUISE FLIGHT AT 33,000 FEET, THEY EXPERIENCED A HYDRAULIC SYSTEM FAILURE. THEY MANUALLY EXTENDED THE LANDING GEAR FOR LANDING AND MADE AN UNEVENTFUL NO FLAPS/NO SLATS LANDING. POST-ACCIDENT INVESTIGATION REVEALED THAT THE LOSS OF HYDRAULIC PRESSURE IN BOTH SYSTEMS WAS DUE TO THE FAILURE OF PTU S/O VALVE BODY ATTACH SCREWS ON THE LEFT SYSTEM VALVE. THIS ALLOWED THE LEFT VALVE BODY TO SEPERATE FROM THE REMAINING ASSEMBLY, PORTING LEFT SYSTEM HYDRAULIC FLUID OVERBOARD, AND SUBSEQUENTLY DEPRESSURIZING THE RIGHT SYSTEM (ALTHOUGH THERE WAS NO LOSS OF RIGHT SYSTEM HYDRAULIC FLUID). THE MANUFACTURER HAD A RE-DESIGNED, STRONGER UNIT AVAILABLE TO OPERATORS; THIS IMPROVED UNIT HAD STRONGER VALVE BODY ATTACH SCREWS, WELDED VALVE BODIES, STEEL GEARS, AND A SHEAR PIN IN THE MOTOR-TO-VALVE GEAR TRAIN.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: FAILURE OF THE HYDRAULIC POWER TRANSFER UNIT SHUT-OFF (PTU S/O) VALVE DUE TO FAILED (FATIGUED) VALVE BODY ATTACH SCREWS.

Findings

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION
Phase of Operation: CRUISE - NORMAL

Findings
1. (C) HYDRAULIC SYSTEM,SHUTOFF VALVE - FAILURE,TOTAL
2. (C) HYDRAULIC SYSTEM - NO PRESSURE

Occurrence #2: ON GROUND/WATER ENCOUNTER WITH TERRAIN/WATER
Phase of Operation: LANDING - FLARE/TOUCHDOWN

Findings
3. (C) TERRAIN CONDITION - RUNWAY
4. (C) HYDRAULIC SYSTEM - UNAVAILABLE

Factual Information

Pilot Information

Certificate:	Airline Transport	**Age:**	39, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	None	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	**Last FAA Medical Exam:**	12/12/1988
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	7450 hours (Total, all aircraft), 150 hours (Last 90 days, all aircraft), 50 hours (Last 30 days, all aircraft), 2 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	MCDONNELL DOUGLAS	**Registration:**	N434AA
Model/Series:	DC-9-82 DC-9-82	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Transport	**Serial Number:**	49452
Landing Gear Type:	Retractable - Tricycle	**Seats:**	172
Date/Type of Last Inspection:	Continuous Airworthiness	**Certified Max Gross Wt.:**	140000 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo Fan
Airframe Total Time:		**Engine Manufacturer:**	P&W
ELT:	Installed, not activated	**Engine Model/Series:**	JT8D-217A
Registered Owner:	AMERICAN AIRLINES	**Rated Power:**	14500 lbs
Operator:	AMERICAN AIRLINES	**Operating Certificate(s) Held:**	Flag carrier (121)
Operator Does Business As:		**Operator Designator Code:**	AALA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Day
Observation Facility, Elevation:	MSP, 841 ft msl	**Distance from Accident Site:**	0 Nautical Miles
Observation Time:	1500 CDT	**Direction from Accident Site:**	0°
Lowest Cloud Condition:	Unknown / 0 ft agl	**Visibility**	20 Miles
Lowest Ceiling:	Broken / 7000 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	9 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	290°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	13°C / -3°C
Precipitation and Obscuration:			
Departure Point:	SEATTLE, WA (SEA)	**Type of Flight Plan Filed:**	IFR
Destination:	CHICAGO, IL (ORD)	**Type of Clearance:**	IFR
Departure Time:	0940 PDT	**Type of Airspace:**	Class E

Airport Information

Airport:	MINNEAPOLIS ST PAUL INTL (MSP)	**Runway Surface Type:**	Asphalt; Concrete
Airport Elevation:	841 ft	**Runway Surface Condition:**	Dry
Runway Used:	29L	**IFR Approach:**	
Runway Length/Width:	10000 ft / 200 ft	**VFR Approach/Landing:**	Full Stop

Wreckage and Impact Information

Crew Injuries:	6 None	**Aircraft Damage:**	Minor
Passenger Injuries:	90 None	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	96 None	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	JODI L REEVES	**Report Date:**	08/26/1992
Additional Participating Persons:	G. PHILLIPS; WASHINGTON, DC J. MEYER; MINNEAPOLIS, MN B. BUDOVEC; LONG BEACH, CA B. RICHARDS; TULSA, OK		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		