



National Transportation Safety Board Aviation Accident Final Report

Location:	MARIETTA, GA	Accident Number:	ATL93MA055
Date & Time:	02/03/1993, 1327 EST	Registration:	N130X
Aircraft:	LOCKHEED L382E-44K-20	Aircraft Damage:	Destroyed
Defining Event:		Injuries:	7 Fatal

Flight Conducted Under: Part 91: General Aviation -

Analysis

THE ACFT WAS DESIGNED & USED AS THE COMPANY'S ENGINEERING TEST BED. AN EVALUATION OF THE FLY-BY-WIRE RUDDER ACTUATOR & GROUND MINIMUM CONTROL SPEED (VMCG) WAS BEING CONDUCTED. DURING THE FINAL HI-SPEED GROUND TEST RUN, THE ACFT ABRUPTLY VEERED LEFT & BECAME AIRBORNE. IT ENTERED A LEFT TURN, CLIMBED TO ABOUT 250 FT, DEPARTED CONTROLLED FLT & IMPACTED THE GRND. INVESTIGATION REVEALED A DESIGN FEATURE IN THE RUDDER ACTUATOR THAT REMOVES HYD PRESSURE WITHIN THE ACTUATOR IF THE RUDDER POSITION COMMANDED BY THE PILOT EXCEEDED THE ACTUAL RUDDER ACTUATOR POSITION FOR A SPECIFIED TIME, AND THE RUDDER AERODYNAMICALLY TRAILS. THE ACTUATOR PREVIOUSLY DISENGAGED IN FLT. THE COMPANY DID NOT CONDUCT A SYSTEM SAFETY REVIEW OF THE RUDDER BYPASS FEATURE & ITS CONSEQUENCES TO ALL FLT REGIMES, NOR OF THE VMCG TEST. THE FLT TEST PLAN SPECIFIED THAT ENGINE POWER BE RETARDED IF THE RUDDER BECAME INEFFECTIVE. NEITHER PLT HAD RECEIVED TRAINING AS AN EXPERIMENTAL TEST PLT. THE COMPANY ALLOWED EXPERIMENTAL FLT TESTS AT A CONFINED, METROPOLITAN ARPT.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: DISENGAGEMENT OF THE RUDDER FLY-BY-WIRE FLIGHT CONTROL SYSTEM RESULTING IN A TOTAL LOSS OF RUDDER CONTROL CAPABILITY WHILE CONDUCTING GROUND MINIMUM CONTROL SPEED TESTS. THE DISENGAGEMENT WAS A RESULT OF THE INADEQUATE DESIGN OF THE RUDDER'S INTEGRATED ACTUATOR PACKAGE BY ITS MANUFACTURER; THE OPERATOR'S INSUFFICIENT SYSTEM SAFETY REVIEW FAILED TO CONSIDER THE CONSEQUENCES OF THE INADEQUATE DESIGN TO ALL OPERATING REGIMES. A FACTOR WHICH CONTRIBUTED TO THE ACCIDENT WAS THE FLIGHT CREW'S LACK OF ENGINEERING FLIGHT TEST TRAINING.

Findings

Occurrence #1: LOSS OF CONTROL - ON GROUND/WATER
Phase of Operation: OTHER

Findings

1. (C) FLT CONTROL SYST,RUDDER CONTROL - INADEQUATE
2. (F) ACFT/EQUIP,INADEQUATE DESIGN - MANUFACTURER
3. (C) INADEQUATE SUBSTANTIATION PROCESS,INSUFF REVIEW - COMPANY/OPERATOR MGMT
4. (C) FLT CONTROL SYST,RUDDER - DISENGAGED
5. (C) DIRECTIONAL CONTROL - NOT POSSIBLE - PILOT IN COMMAND
6. PROCEDURES/DIRECTIVES - NOT FOLLOWED - PILOT IN COMMAND
7. (F) INADEQUATE TRAINING - COMPANY/OPERATOR MANAGEMENT

Occurrence #2: LOSS OF CONTROL - IN FLIGHT
Phase of Operation: TAKEOFF - INITIAL CLIMB

Findings

8. LIFT-OFF - PERFORMED - PILOT IN COMMAND
9. (C) AIRCRAFT CONTROL - NOT POSSIBLE - PILOT IN COMMAND
10. STALL/SPIN - INADVERTENT - PILOT IN COMMAND

Occurrence #3: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: TAKEOFF - INITIAL CLIMB

Factual Information

Pilot Information

Certificate:	Airline Transport; Flight Instructor; Flight Engineer	Age:	42, 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):	Airplane Multi-engine; Instrument Airplane	Toxicology Performed:	Yes
Medical Certification:	Class 1 Valid Medical--no waivers/lim.	Last FAA Medical Exam:	07/30/1992
Occupational Pilot:		Last Flight Review or Equivalent:	
Flight Time:	7658 hours (Total, all aircraft), 1260 hours (Total, this make and model), 5276 hours (Pilot In Command, all aircraft), 74 hours (Last 90 days, all aircraft), 16 hours (Last 30 days, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	LOCKHEED	Registration:	N130X
Model/Series:	L382E-44K-20 L382E-44K-	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	No
Airworthiness Certificate:	Experimental	Serial Number:	4412
Landing Gear Type:	Retractable - Tricycle	Seats:	7
Date/Type of Last Inspection:	03/05/1991, Continuous Airworthiness	Certified Max Gross Wt.:	155000 lbs
Time Since Last Inspection:	29 Hours	Engines:	4 Turbo Prop
Airframe Total Time:	6708 Hours	Engine Manufacturer:	ALLISON
ELT:	Not installed	Engine Model/Series:	501-M71K
Registered Owner:	LOCKHEED AERO. SYSTEMS CO.	Rated Power:	5250 hp
Operator:	LOCKHEED AERO. SYSTEMS CO.	Operating Certificate(s) Held:	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:	Day
Observation Facility, Elevation:	MGE, 1032 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	1330 EST	Direction from Accident Site:	100°
Lowest Cloud Condition:	Scattered / 25000 ft agl	Visibility	7 Miles
Lowest Ceiling:	None / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	3 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	130°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	30 inches Hg	Temperature/Dew Point:	10° C / -12° C
Precipitation and Obscuration:			
Departure Point:	(MGE)	Type of Flight Plan Filed:	Company VFR
Destination:	(MGE)	Type of Clearance:	VFR
Departure Time:	1326 EST	Type of Airspace:	Class D; Class E

Airport Information

Airport:	DOBBINS AFB (MGE)	Runway Surface Type:	Concrete
Airport Elevation:	1032 ft	Runway Surface Condition:	Dry
Runway Used:	11	IFR Approach:	None
Runway Length/Width:	10000 ft / 300 ft	VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	7 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	N/A	Aircraft Fire:	On-Ground
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	7 Fatal	Latitude, Longitude:	

Administrative Information

Investigator In Charge (IIC):	PRESTON E HICKS	Report Date:	03/18/1994
Additional Participating Persons:	ROFF SASSER; ATLANTA, GA CARROLL A SMITH; MIAMI, FL FRANK HILLDRUP; WASHINGTON, DC CHARLES PEREIRA; WASHINGTON, DC		
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.nts.gov/pubdms/ .		

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