Aviation Investigation Final Report

Location:	San Jose, California	**Accident Number:**	WPR23LA116
Date & Time:	February 20, 2023, 14:25 Local	**Registration:**	N9267P
Aircraft:	Piper PA-24-260	**Aircraft Damage:**	Substantial
Defining Event:	Landing gear collapse	**Injuries:**	2 None
Flight Conducted Under:	Part 91: General aviation - Personal		

Analysis

The pilot reported the takeoff and flight were uneventful. During the landing approach, the landing gear did not extend. After performing a series of troubleshooting steps with no success, the pilot decided to return to his home airport and perform a manual gear extension. During the return flight, the manual gear system appeared to be jammed, so he continued to troubleshoot and performed a series of high-G maneuvers to help the gear extend. After multiple attempts the landing gear extended; however, the gear indication system did not show the gear was locked in the down position. The pilot continued with the landing, which was uneventful, until he retarded the throttle during the landing roll and the nose gear and main gear retracted.

Postaccident examination revealed that the landing gear extension motor would intermittently seize, often without tripping its circuit breaker. Because the airplane was equipped with an emergency gear extension system, this event alone should not have been cause for concern, and the pilot followed the correct procedures to resolve the problem. However, the manual emergency gear extension system was also jammed because of significant wear to its release arm. Additionally, due to a worn and out of adjustment nose gear drag link assembly, even when the pilot was able to force the gear down with the manual system, it did not lock in place. Due to the design of the system, this out of adjustment condition was masked by the landing gear motor transmission, which under normal operation drove the drag links into the locked position.

An airworthiness directive had been issued to resolve the gear collapse issue following manual extension, and this appeared to have been completed and was not due at the time of the accident. Even though it was not due, the wear observed to multiple landing gear components should have warranted further examination and repair by maintenance personnel during the annual inspection, which was completed one week before the accident.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be:

A landing gear collapse due to an inadequately maintained landing gear extension and retraction system.

Findings

Aircraft	Gear extension and retract sys - Fatigue/wear/corrosion
Personnel issues	Scheduled/routine maintenance - Maintenance personnel
Aircraft	Gear extension and retract sys - Not serviced/maintained

Factual Information

History of Flight

Landing-landing roll	Landing gear collapse (Defining event)
Landing-landing roll	Abnormal runway contact

On February 20, 2023, about 1425 Pacific standard time, a Piper PA24-260, N9267P, sustained substantial damage when it was involved in an accident in San Jose, California. The pilot and passenger were not injured. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 flight.

The pilot departed from his home base of Reid-Hillview Airport (RHV) with a destination of Half Moon Bay Airport (HAF) and reported that the flight was uneventful.

While on the landing approach, he performed the pre-landing checks and realized that he had not heard any movement of the landing gear. He checked the landing gear light, and it was not green, and the emergency extension handle had not moved forward to the landing position.

The pilot cycled the landing gear switch, but the gear did not extend so he decided to abort the landing and fly out over the ocean to troubleshoot. During that time, he checked the landing gear circuit breaker and it had not tripped and did not appear to be hot. He then cycled landing gear switch but the gear still did not extend.

He decided to return to RHV where there were emergency and maintenance services, rather than proceed with a landing at HAF. Once within the San Jose area, he released the emergency release arm in accordance with the emergency procedures. The landing gear still did not extend and the telescoping emergency extension bar was jammed and did not move forward. He decided to perform a series of high-G maneuvers to help the gear extend and during each pull-up he pushed the extension handle. After multiple attempts the handle finally moved forward to what appeared to be the fully extended position; however, the green landing gear light still did not illuminate.

He then decided to land at RHV after tower controllers at San Jose International Airport and RHV reported that the gear was down. The landing was uneventful; however, when the pilot retarded the throttle the nose gear started to retract, followed by the main gear.

The airplane sustained structural damage to both lower center beams and multiple bulkheads during the ensuing ground roll.

The airplane was equipped with retractable tricycle landing gear operated through an electrically controlled retraction system. The system consisted of an electrical motor and transmission that drove a torque tube and bellcrank connected to push-pull cables for each main and nose gear strut assembly. All three landing gear move simultaneously when activated and were held down and locked with over-center links. In the event of an emergency, such as when the gear cannot be extended due to a failure in the motor or transmission, a release arm can be used to disconnect the motor, and the gear can then be extended manually by pushing the emergency extender bar fully forward.

The airplane was examined by the National Transportation Safety Board investigator-in-charge at RHV airport following the accident.

During the examination, it was found that the landing gear motor would intermittently stop operating and pause at the retracted position. During multiple cycles it was found that the fault would not always be accompanied by the landing gear circuit breaker tripping. The transmission jackscrew assembly was coated in grease and did not show any evidence of binding and the motor did not emit any smoke. There was no evidence in the maintenance records that the motor had ever been replaced.

Examination of the emergency gear release system revealed that the emergency disengage arm and links exhibited wear to their pivot pins and holes, such that when the arm was pulled it did not provide the leverage required to consistently release the motor transmission from the landing gear bellcrank assembly. Under this condition, because the bound motor remained connected, it inhibited movement of the bellcrank assembly and the landing gear could not be extended with the emergency extension bar.

Even when the disengage assembly opened and the gear could be extended by the emergency extension bar, due to a worn and out of adjustment drag link assembly in the nose landing gear a firm forward application of force to the nosewheel would cause the nose gear to unlock. Due to the simultaneous design, this would also unlock the main gear. This condition had been masked by the landing gear motor transmission assembly, which under normal operation drove the drag links into the locked position.

Further examination revealed that the entire landing gear system appeared to be dirty and coated in old grease and grime. The nose landing drag link assemblies were slightly loose at their fuselage fittings and could be seen to move with landing gear movement.

Airworthiness Directive (AD) 77-13-21 was issued in 1977 to prevent collapse of the landing gear after manual extension as in the accident scenario. The AD required a specific landing gear inspection at 1,000-hour intervals and the installation of a second nose gear downlock spring, both in accordance with Piper Aircraft Service letter 782. The AD also required periodic inspection of the main landing gear bungee cords, with replacement at 500-hour intervals.

The inspection portion of the AD was last completed in 2007, and not due for another 306 hours. The second spring was present, and the bungees were replaced in June 2020, 78 flight hours before the accident. The mechanic, who performed the most recent annual inspection one week before the accident, stated that he performed a functional check of the landing gear while the airplane was on jacks, with no anomalies noted.

The airplane's maintenance logbook indicated the airplane was examined in accordance with "FAR Part 43 appendix D." Subpart (e) of those regulations is devoted to the inspection of the landing gear group, and makes multiple specific references, including, "All units—for poor condition and insecurity of attachment," "Linkages, trusses, and members—for undue or excessive wear fatigue, and distortion," and "Retracting and locking mechanism—for improper operation."

Pilot Information

Certificate:	Private	**Age:**	71
Airplane Rating(s):	Single-engine land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	None	**Restraint Used:**	Lap only
Instrument Rating(s):	Airplane	**Second Pilot Present:**	No
Instructor Rating(s):	None	**Toxicology Performed:**	
Medical Certification:	Class 3 Without waivers/limitations	**Last FAA Medical Exam:**	December 21, 2021
Occupational Pilot:	No	**Last Flight Review or Equivalent:**	February 28, 2022
Flight Time:	3103 hours (Total, all aircraft), 2254 hours (Total, this make and model), 2997 hours (Pilot In Command, all aircraft), 5.3 hours (Last 90 days, all aircraft), 2.6 hours (Last 30 days, all aircraft), 1.7 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	**Registration:**	N9267P
Model/Series:	PA-24-260	**Aircraft Category:**	Airplane
Year of Manufacture:	1968	**Amateur Built:**	
Airworthiness Certificate:	Normal	**Serial Number:**	24-4767
Landing Gear Type:	Retractable - Tricycle	**Seats:**	4
Date/Type of Last Inspection:	February 13, 2023 Annual	**Certified Max Gross Wt.:**	3100 lbs
Time Since Last Inspection:	2 Hrs	**Engines:**	1 Reciprocating
Airframe Total Time:	7095.46 Hrs as of last inspection	**Engine Manufacturer:**	Lycoming
ELT:	C91A installed, not activated	**Engine Model/Series:**	IO-540-D4A5
Registered Owner:	On file	**Rated Power:**	260 Horsepower
Operator:	On file	**Operating Certificate(s) Held:**	None

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	**Condition of Light:**	Day
Observation Facility, Elevation:	KSJC,62 ft msl	**Distance from Accident Site:**	5.5 Nautical Miles
Observation Time:	13:53 Local	**Direction from Accident Site:**	300°
Lowest Cloud Condition:	Few / 6000 ft AGL	**Visibility**	10 miles
Lowest Ceiling:	Broken / 9000 ft AGL	**Visibility (RVR):**	
Wind Speed/Gusts:	8 knots /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:	340°	**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30.11 inches Hg	**Temperature/Dew Point:**	18°C / 4°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	San Jose, CA (RHV)	**Type of Flight Plan Filed:**	VFR
Destination:	Half Moon Bay, CA (HAF)	**Type of Clearance:**	None
Departure Time:	11:48 Local	**Type of Airspace:**	Class D

Airport Information

Airport:	REID-HILLVIEW OF SANTA CLARA COUNTY RHV	**Runway Surface Type:**	Asphalt
Airport Elevation:	135 ft msl	**Runway Surface Condition:**	Dry
Runway Used:	31L	**IFR Approach:**	None
Runway Length/Width:	3100 ft / 75 ft	**VFR Approach/Landing:**	Full stop;Precautionary landing

Wreckage and Impact Information

Crew Injuries:	1 None	**Aircraft Damage:**	Substantial
Passenger Injuries:	1 None	**Aircraft Fire:**	None
Ground Injuries:		**Aircraft Explosion:**	None
Total Injuries:	2 None	**Latitude, Longitude:**	37.332861,-121.8198(est)

Administrative Information

Investigator In Charge (IIC):	Simpson, Eliott
Additional Participating Persons:	David Straughn; Federal Aviation Administration; San Jose, CA
Original Publish Date:	June 20, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	The NTSB did not travel to the scene of this accident.
Investigation Docket:	https://data.ntsb.gov/Docket?ProjectID=106827

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The NTSB does not assign fault or blame for an accident or incident; rather, as specified by NTSB regulation, "accident/incident investigations are fact-finding proceedings with no formal issues and no adverse parties … and are not conducted for the purpose of determining the rights or liabilities of any person" (Title 49 *Code of Federal Regulations* section 831.4). Assignment of fault or legal liability is not relevant to the NTSB's statutory mission to improve transportation safety by investigating accidents and incidents and issuing safety recommendations. In addition, statutory language prohibits the admission into evidence or use of any part of an NTSB report related to an accident in a civil action for damages resulting from a matter mentioned in the report (Title 49 *United States Code* section 1154(b)). A factual report that may be admissible under 49 *United States Code* section 1154(b) is available here.