



NATIONAL TRANSPORTATION SAFETY BOARD

Office of Aviation Safety
Western Pacific Region

LANDING GEAR OPERATIONAL CHECKS KSJC

WPR18LA153

Accident Date: May 20, 2018
Exam Date: June 28, 2018

This document contains 6 embedded images

A. ACCIDENT

Location: KSJC
Date: May 20, 2018
Aircraft: Piper PA-24 N244TW, Serial # 24-554
NTSB IIC: Michael Huhn

B. EXAMINATION PARTICIPANTS:

Michael Huhn
Air Safety Investigator
NTSB
Western Pacific Region

Wilbert 'JR' Robinson
Aviation Safety Inspector
FAA
San Jose, CA

C. ACCIDENT SUMMARY

On May 20, 2018, about 1950 Pacific Daylight Time, a Piper PA24-250, N244TW, sustained substantial damage shortly after landing at Norman Y. Mineta San Jose International Airport (SJC) San Jose, California. The pilot was not injured. The personal flight was conducted under the provisions of Title 14 Code of Federal Regulations Part 91 and visual flight rules (VFR). Visual meteorological conditions prevailed.

According to the pilot, he had placed the landing gear switch in the DOWN position while on downwind, and the green instrument panel light that indicated the landing gear was down was illuminated. He landed normally, and when the airplane had slowed to about 30 mph, all 3 landing gear collapsed.

D. EXAMINATION DETAILS

1.0 Background Information

- After the accident, the airplane was recovered to a ramp on the airport
- The recovery process included lifting the airplane; when it was lifted, the landing gear swung to the partially deployed position, and a technician pulled forward on the NLG to 'lock' the gear down
- The airplane was then towed on its gear to the ramp parking spot, where it remained, essentially untouched, until this exam
- The airplane was towed to the CAT hangar and placed on jacks at KSJC by permission of NTSB/FAA
- The airplane battery appeared to be partially drained, so external 12VDC power was provided to the airplane
- The landing gear is electrically controlled and actuated

2.0 Exam Procedures & Results

- The master switch was turned ON
 - Neither the green (down/locked) or amber (gear in transit) landing gear status panel lights were illuminated
- The gear switch was moved to the UP position
 - The gear retracted and the motor shut off
 - The amber status light illuminated
- The gear switch was moved to the DOWN position
 - The gear extended but the motor continued to run
 - The amber light extinguished, but the green light did not illuminate
 - Turning the master switch OFF stopped the gear motor
- The gear switch was used to cycle the gear up and down a second time
 - The same results were observed
- With the gear extended and the power off, the 3 landing gear were manually manipulated to try to 'unlock' the gear and move it/them towards the retract position
 - The 2 MLG were unable to be moved/unlocked/dislodged when the tires/wheels were pushed inboard (their normal retraction direction)
 - Light to moderate kicks in the aft direction on the NLG tire caused the system to 'unlock', and all 3 gear to move in their respective retracted directions
 - The 'unlock' kick force was estimated by the NTSB IIC to be about 30 pounds
 - The gear moved freely, and could be manually pushed up to nearly the retracted position
 - The NLG was pulled forward/down to 'relock' the gear
 - The NLG 'kicks' were repeated several times, with the same 'unlock' results
- Upward pressure on the NLG left forward drag link, just forward of its rotating joint with the left rear drag link, resulted in the gear 'unlocking' and able to move freely towards the retracted position
 - This process was repeatable following manually returning the gear to the down/locked position
 - The upward force was measured several times; it was repeatedly about 47 pounds
- A non-adjustable hard stop mechanism for NLG gear extension was integral to the left and right rotating junctions of the forward and aft drag links
 - These stops were formed by machined flats on the forward and aft drag links that mated/met to prevent further joint rotation
 - As found, neither stop was functioning as a stop; A gap of about 1/16" remained in the left stop, and a gap of about 1/8" remained in the right stop
 - Neither forward pressure nor kicks to the NLG altered the gaps
 - The gaps appeared to be able to be alterable by adjustment of the NLG actuating rod and rod end assembly that extended forward from the landing gear motor/transmission assembly
 - That rod, rod end, and locknut assembly did not appear to have been altered since the airplane was painted (the paint was non-original)
- Each landing gear was equipped with a microswitch and actuation tab assembly (tab depresses microswitch button) when the gear was fully extended
- The NLG tab did not visually appear to actuate/depress the microswitch button when the NLG was extended

- When the 3 gear were manually positioned in the intermediate/in-transit position (so that none of the 3 tabs were contacting their respective microswitch buttons), with the master switch ON, and the 3 microswitch buttons were manually all depressed concurrently, the green panel landing gear light illuminated
 - When the right MLG button was released, the green panel light extinguished
- When the gear was returned to the extended position, with the master switch ON, the gear motor continued to run even though the gear motion ceased
 - When the NLG microswitch button was manually depressed, the green panel landing gear light illuminated, and the gear motor shut off
- These results indicated that the green light was wired in sequence, and required all 3 microswitches to be depressed/actuated
- These results also indicated that the gear extension motor shutoff switch required all 3 microswitches to be depressed/actuated
- These test and examination results can not currently explain why the pilot had the green light in flight and why that light was now inoperative
- When the gear was retracted by the normal system, the NLG fully retracted and the NLG door fully closed; however both MLG tires protruded about 2 – 2 ½ inches from the lower wing surface at their most inboard points.
 - The MLG doors were within ~ 1/2 to 1/4 inch of fully closed/sealed at their most inboard edges
- No other system operational or appearance anomalies were observed
- These results, pending subsequent closer inspection/examination for damaged drive and linkage components, are inconclusive
 - If no system damage/deformation is detected, these results suggest that the landing gear was not properly rigged; however the current failure of the NLG microswitch to actuate via gear extension needs to be explained/determined
 - If other damage/deformation is detected, those observations will need to be considered regarding their potential contribution to the event and test results

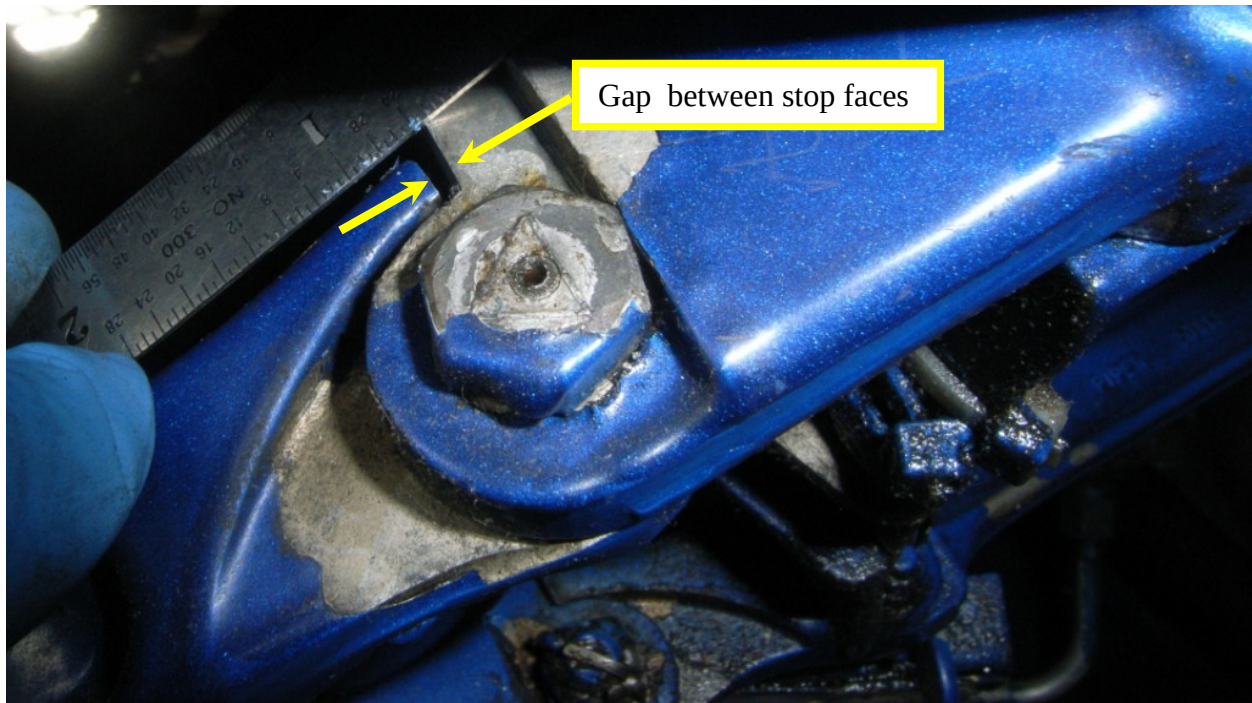


Figure 1 – NLG Left Drag Link Joint Stop Gap

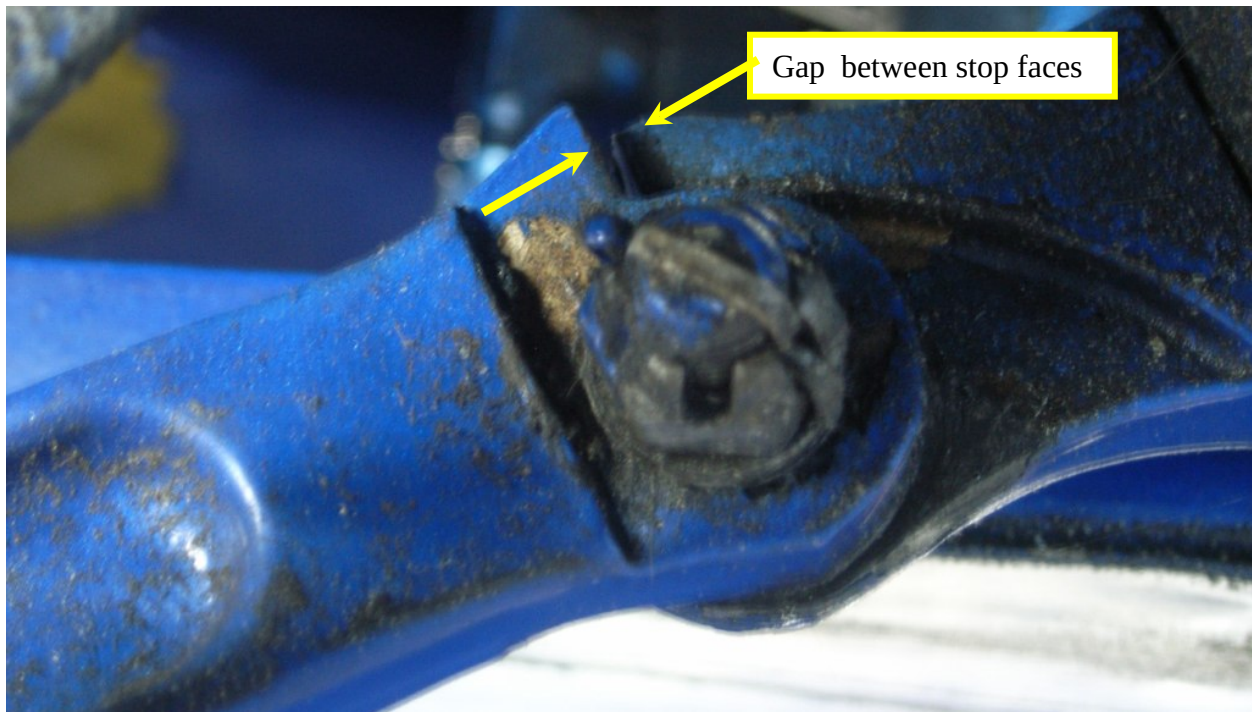


Figure 2 - NLG Right Drag Link Stop Gap



Figure 3 - NLG Actuating Rod with Adjustable Rod End



Figure 4 - RMLG Retracted by Normal System Operation



Figure 5 - RMLG Retracted by Normal System Operation

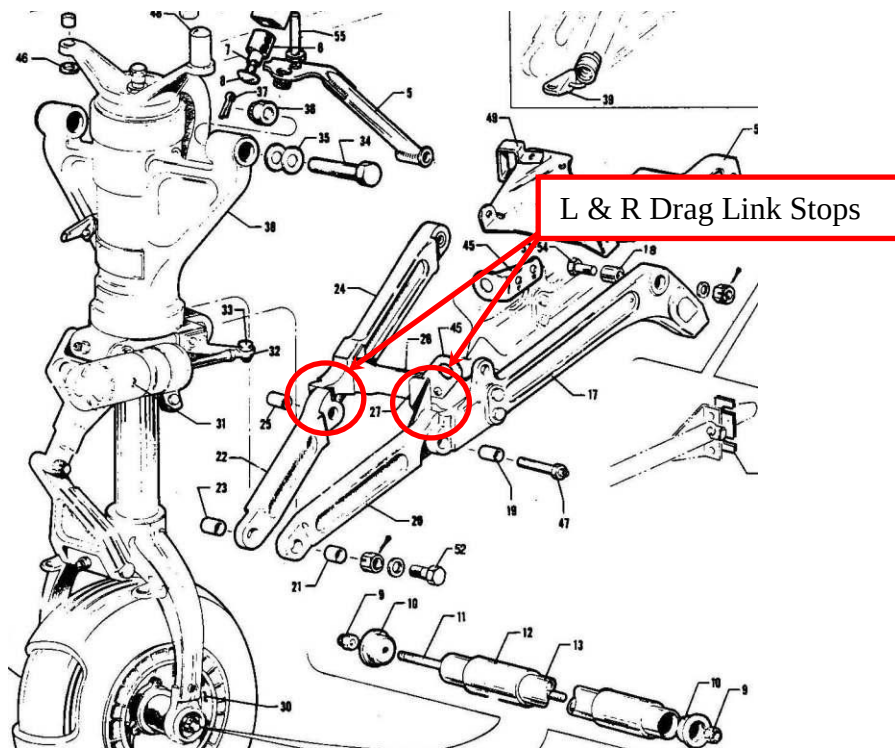


Figure 6 - NLG Diagram