



NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety

AIRWORTHINESS GROUP CHAIRMAN'S FACTUAL REPORT

April 22, 2021

A. ACCIDENT

ERA20LA237

Operator: Private
Location: Titusville, Florida
Date: July 3, 2020
Time: 1157 Eastern Daylight Time (EDT)
Aircraft: Piper PA-46-600TP (M600), SN 4698109
Registration: N89MA

B. STRUCTURES GROUP

Chairman: Clinton R. Crookshanks
National Transportation Safety Board
Denver, Colorado

Member: Eric West
Federal Aviation Administration
Washington, District of Columbia

Member: Robert Martellotti
Piper Aircraft, Inc.
Vero Beach, Florida

C. SUMMARY

On July 3, 2020, about 1157 eastern daylight time, a Piper PA-46-600TP, N89MA, was substantially damaged when it was involved in an accident near Titusville, Florida. The pilot and two passengers were not injured. The airplane was operated as a Title 14 Code of Federal Regulations Part 91 personal flight.

D. DETAILS OF THE INVESTIGATION

1.0 Aircraft

The Piper PA-46-600TP M600 is a single turbine engine, propeller driven, low wing airplane that was certified in June 2016, Figure 1. The airplane is equipped with a conventional tail, retractable tricycle landing gear, and can carry a single pilot and 5 passengers. The airplane is 29.7 feet long, 11.3 feet high at the tail and has a wingspan of 43.16 feet. The airplane is powered by a Pratt & Whitney Canada PT6A turbine engine that drives a Hartzell four or five-blade constant speed, full feathering, reversible propeller.

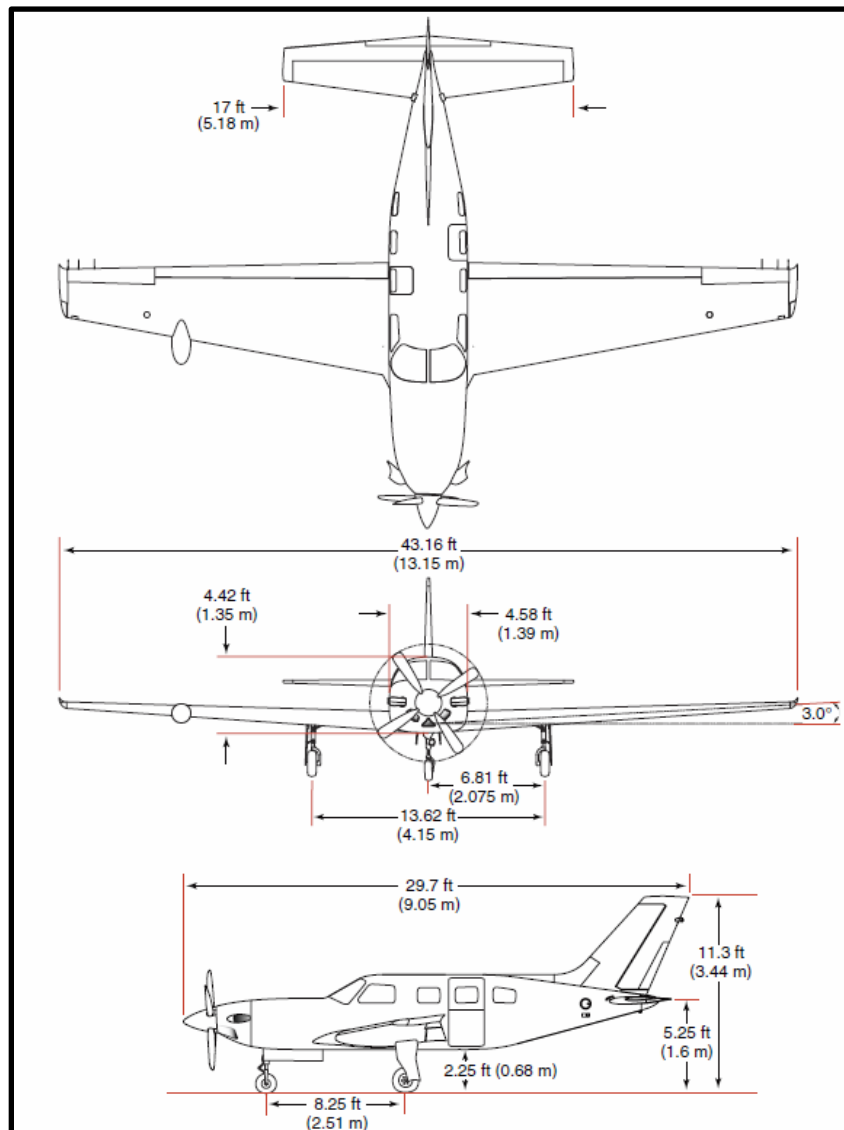


Figure 1-Piper PA-46-600TP M600 airplane 3-view drawing.

1.1 Nose Landing Gear Steering

The retractable nose landing gear (NLG) is attached to the engine mount at the upper end of the trunnion assembly by two trunnion bolts. The NLG strut assembly is installed inside the trunnion assembly where it can rotate for nose wheel steering. The retract actuator is attached to the NLG trunnion assembly and engine mount to allow the NLG to retract aft into the wheel well. A down spring is also attached to the trunnion assembly and engine mount to assist with NLG extension if there is a hydraulic failure. During retraction, the NLG strut and tire rotate 90° left through a mechanism that stows the NLG tire in a horizontal position. The NLG is steerable through a 50° arc by use of the rudder pedals, 20° left and 30° right, Figure 2. The pilot and right seat rudder pedals are hung from a torque tube assembly below the instrument panel that connects both right rudder pedals to each other and both left rudder pedals to each other. The rudder is connected by cables to sectors on the rudder pedal torque tubes. The rudder cables run aft through the fuselage to the rudder sector. The pilot right rudder pedal and the right seat left rudder pedal are connected to the steering bell-crank through pushrods that translate the linear motion of the pedals to a rotational motion of the bell-crank. The steering bell crank is attached to a fitting in the aft end of the NLG wheel well. Bellows assemblies are installed around the pushrods where they pass through the pressure bulkhead. The primary rudder mechanical stops are located adjacent to the rudder sector in the empennage to limit the deflection of the rudder and thus the motion of the rudder pedals. Secondary rudder pedal mechanical stops are installed in a machined aluminum fitting aft of the steering bell-crank. The secondary stops allow for a small amount of additional motion of the rudder pedals as the rudder cables stretch before the stops engage the steering bell-crank. The steering bungee is connected to the left side of the steering bell-crank at the aft end and to the left side of the steering arm at the forward end to translate the rotational motion of the bell-crank to a rotational motion of the steering arm. A spring is installed in the bungee to dampen any vibrations from the NLG. The steering arm is attached to a mount plate on the engine mount with a bolt and can be adjusted forward and aft for proper rigging through a locking assembly. The NLG steering horn is attached to the top of the NLG strut with 3 bolts. With the gear in the extended position the right and left forward faces of the steering arm engage the right and left pads and rollers on the steering horn to transmit the rotational motion of the steering arm to a rotational motion of the NLG strut. When the NLG retracts, the strut rotates about the trunnions and the steering horn disengages from the steering arm preventing rudder pedal motion from being translated to NLG steering.

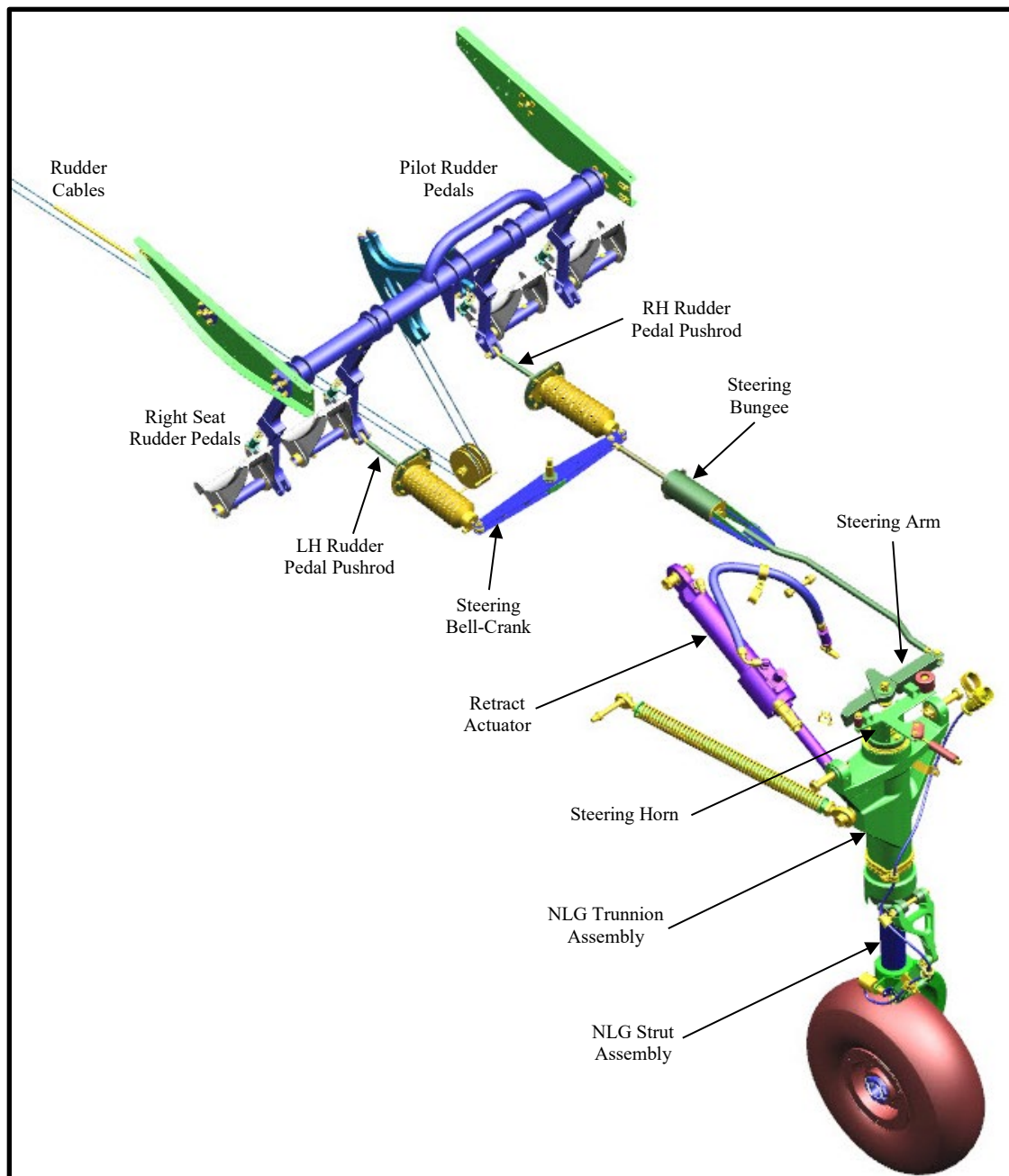


Figure 2-M600 Steering system illustration.

1.2 Aircraft Towing

The airplane can be maneuvered on the ground by power equipment using a tow bar attached to the NLG axle. Piper has established turn limits for towing and a placard is installed on the lower end of the NLG trunnion assembly. A corresponding red line on the NLG strut allows the operator to see the relationship between the turn angle of the NLG strut and wheel and the towing limits, Figure 3. The placard towing limits allow for turning about 20° right and left.



Figure 3-M600 NLG turn limits placard.

The Piper M600 Pilot's Operating Handbook (POH) contains a caution about towing in Section 8 – Handling, Servicing and Maintenance as shown in Figure 4. Similar cautions are contained in the M600 Aircraft Maintenance Manual (AMM), Section 9-10-00 and the M600 Training Manual, Chapter 12.

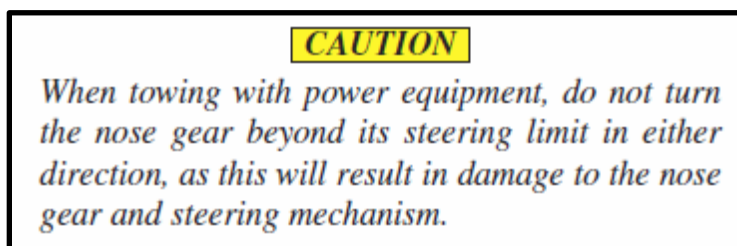


Figure 4-M600 POH Towing Caution.

If the NLG is externally turned beyond the left or right placard limits, mechanical stops will engage where portions of the NLG and steering mechanism come into contact. If turned beyond limits to the right, a machined stop on the lower portion of the rotating strut assembly will contact a machined stop on the lower end of the stationary trunnion assembly, Figure 5. The right stops will engage when the NLG tire is turned about 36° right. Further turning to the right may damage the machined stops and will load the strut-trunnion interface but will not affect the steering arm or steering horn. If turned beyond limits to the left, the steering arm left flange aft face will contact the steering arm mount plate on the engine mount, Figure 6. The left stops will engage when the NLG tire is turned about 30.5° left. Further turning to the left may damage the steering arm or mount plate or may apply a torsional load to the steering horn installed on top of the NLG strut. The rudder primary and secondary mechanical stops do not allow the mechanical turn limit stops to engage through pilot input at the rudder pedals. There are machined stops on the left side of the lower strut and trunnion assemblies similar to those on the right. These stops can only engage during NLG retraction as the strut rotates 90° to stow in the wheel well.



Figure 5-M600 Right turn mechanical stop between trunnion and strut just prior to engagement.



Figure 6-M600 Left turn mechanical stop between engine mount and steering arm just prior to engagement.

1.3 Aircraft Landing Procedures

The POH contains the airplane normal procedures in Section 4 and the landing procedures are contained in section 4.5p, as shown in Figure 7. The procedures caution the pilot about centering the rudder prior to nose wheel touchdown.

4.5p LANDING

CAUTION

In crosswind conditions, the nosewheel may not be aligned with the runway as the wheel touches down because of opposite rudder input. To prevent swerving in the direction the nosewheel is offset, the rudder must be promptly centered just as the nosewheel touches down.

CAUTION

Abrupt or aggressive application of reverse thrust during landing rollout, especially during crosswind landings, may reduce directional control.

NORMAL TECHNIQUE

POWER Lever.....IDLE
Brakes.....MODERATE (or as required)
POWER Lever..... BETA (or REVERSE as required)

Figure 7-POH Normal landing procedures.

2.0 Accident Aircraft Examination

The NTSB did not travel to the accident site due to COVID-19 pandemic travel restrictions in place. The following information was developed from photos and notes obtained from the pilot, airport manager, and the Piper air safety investigator that examined the airplane in person.

The pilot reported that the airplane started a “hard-steer” to the right as soon as the NLG tire contacted the runway. He attempted to correct the track with left rudder and left brake, but the airplane did not respond. The airplane departed the right side of the runway and came to rest in the grass about 100 feet from the runway edge. During the excursion in the grass, the airplane rolled to the left and pitched down and the left wingtip and propeller struck the ground. The airplane came to rest on a heading about 30°, about 120° from the runway 27 heading.

The outboard 4-5 feet of the left wing was deformed upward, the upper wing skin was buckled and both wing spars were bent. The left aileron was buckled upward about mid-span. Four of the five propeller blades were fractured and separated. The left side of the fuselage was buckled above the rear spar attach point. The left main landing gear (LMLG) strut and tire were rotated to the right and the lower portion of the strut was deformed about 15° right. The torque links were separated at the apex and the apex bolt was installed in the upper torque link. The nut and cotter pin from the apex bolt were not recovered. The LMLG tire beads were separated from the wheel and the tire was deflated. The right main landing gear (RMLG) was intact and unremarkable, and the tire was inflated. Both MLG tires had crosswise scuffing of the tread.

The NLG tire was aligned with the longitudinal axis of the airplane after it came to rest in the grass. The NLG strut and lower fork were deformed to the right such that the wheel was offset about 25° from vertical. There was dirt and grass embedded between the left tire bead and wheel, Figure 8. The NLG tire had crosswise scuffing of the tread that extended part way up the left sidewall. The steering horn was separated from the strut and all 3 bolts were fractured. The head of one fractured bolt was retained by safety wire and the other two heads were not recovered. The threaded shanks of the fractured bolts remained installed in the strut. The NLG tire pressure was measured at 91 psi. There was mechanical damage noted to the right turn mechanical stops on the trunnion and strut. There was mechanical damage noted to the aft face of the left side of the steering arm that serves as the left turn mechanical stop. There were wear marks in the paint on the forward faces of the steering arm where they interfaced with the steering horn pads and rollers. The left and right rudder pedal pushrod forward rod ends had several threads exposed forward of the jam nut.



Figure 8-NLG tire with embedded dirt and grass and crosswise scuffing.

The NLG assembly, steering horn, steering arm, steering bungee, LMLG torque links and the LMLG torque links apex bolt were retained and shipped to the NTSB Materials Laboratory for further examination. See the NTSB Materials Laboratory Factual Report 21-012 in the public docket for the details of the examination.

3.0 Runway Examination

There were distinct rubber transfer marks in the white paint of the Runway 27 right aiming point marking where the airplane departed the runway, Figure 9. The LMLG and RMLG rubber transfer marks showed four parallel lines with spaces between consistent with the tire tread patterns and the tires rolling with brakes applied. The LMLG rubber transfer marks were darker in appearance than the RMLG consistent with heavier braking action on the left wheel. The NLG rubber transfer mark was a darker and wider line with no tread pattern consistent with a skidding tire.



Figure 9-Rubber transfer marks on white Runway 27 right aiming point marking.

The rubber transfer marks were more difficult to discern on the asphalt but were able to be traced back to the touchdown point on the runway. The rubber transfer marks indicated the airplane MLG touched down about 620 feet from the Runway 27 threshold and the airplane was about 4 feet left of the centerline. The NLG tire markings were traced back to the land and hold short operation lines (used when operating on runway 09) painted on runway 27 about 770 feet from the threshold. The NLG markings were heavier and darker than the MLG markings with no tread pattern visible consistent with a skidding tire from the moment of touchdown. There was a short dark skid mark prior to the hold lines in line with the continuous NLG tire markings. The markings became darker along the length and arced to the right from their inception. The airplane tire markings departed the right side of the paved area centered about 1,140 feet from the threshold. The ground scars in the grass from the runway departure point to the airplane resting point showed disturbed grass where the RMLG traveled, trenching where the LMLG traveled and heavy trenching where the NLG traveled, Figure 10. The disturbed areas in the grass were continuous from the edge of the runway to the location where the airplane came to rest.



Figure 10-Ground scars in grass on the right side of Runway 27 from landing gear.

4.0 Maintenance Records Examination¹

The accident airplane, S/N 4698109, received its airworthiness certificate on December 7, 2019. The engine was replaced while the airplane was still at the Piper factory service center on December 23, 2019, after accruing 7.9 hours of total time and the fuel control was replaced on January 3, 2020. On January 17, 2020, the steering horn, P/N 85154-012, was removed from the NLG so that the steering pads could be resurfaced in accordance with the manufacturing drawing. The steering horn was reinstalled while the airplane was still at the Piper factory service center after it had accrued 8.4 hours total time. The pilot purchased the airplane in June 2020 with about 23 hours of total time. The airplane was purchased through Flightline Group, Inc. in Tallahassee, FL, who received the airplane from Muncie Aviation Company in Muncie, IN.

The airplane manufacturer's Warrantable 1st 50-hour inspection was completed by Flightline Group, Inc., on July 1, 2020. During this maintenance visit the LMLG strut was replaced, the LMLG tire was replaced, the MLG alignment was adjusted, and the NLG squat switch was adjusted among other items. The airplane had accrued 48.1 hours total time at the time of the maintenance.

5.0 Flight and Towing History

After the maintenance visit, on July 1, 2020, the airplane was flown by a Flightline pilot from Tallahassee International Airport (TLH) to Albert Whitted Airport (SPG), St. Petersburg, FL, to pick up the airplane's pilot. The pilot then flew from SPG back to TLH to return the Flightline pilot before returning to SPG.

The pilot reported that the airplane was parked on the general aviation ramp at SPG facing north on

¹ The pertinent maintenance records are contained in Appendix A.

the day of the accident. After loading passengers and starting the engine, the pilot performed a 180° turn to join taxiway Delta and proceeded towards runway 25 for departure. The pilot made a right turn onto runway 18, a left turn onto runway 7 and back taxied to the end of runway 25 before making a right 180° turn to line up for takeoff on runway 25. The pilot flew the airplane from SPG to Space Coast Regional Airport (TIX), Titusville, FL, where the accident occurred. The aircraft accrued 3.7 hours total time during these flights after maintenance.

The pilot reported that the airplane was towed 6 times at his home airport, SPG, during the time he flew the airplane for the owner, and he was present for each. The airplane was towed at least once by a maintenance facility in Vero Beach, FL, in June 2020 that was not witnessed by the pilot. The airplane was also towed an unknown number of times during the 50-hour maintenance visit at Flightline that the pilot did not witness. The pilot reported there was no evidence of a tow exceedance during his preflight inspection on the day of the accident.

6.0 Tests and Research

6.1 Steering Horn Assembly

The accident airplane had a part number (PN) 85154-012 steering horn assembly installed at manufacture. The 85154-012 steering horn assembly consists of a steel base (PN 85154-004), tube (PN 85154-003), gusset (PN 85154-006), top plate (PN 85154-013), and two steering pads (PN 85154-010 and -011) welded together in accordance with drawing 85154, Figure 11. The steering horn is attached to the NLG strut with 3 bolts through the base. A PN 83638-005 rub block is attached to the forward leg of the top plate, a PN 83638-002 roller (large) is attached to the left leg of the top plate, and a PN 83638-006 roller (small) is attached to the right leg of the top plate through the holes shown in accordance with revision C of the Nose Landing Gear Assy drawing 46N32A001. The two steering pads and two steering rollers interface with the steering arm to provide nose wheel steering with the NLG in the down position. The 85154-012 steering horn assembly was the same as used on the M500 airplane and was installed on M600 airplanes with serial number (SN) 4698001 to SN 4698135. Piper discovered alignment issues with certain steering horn assemblies installed on airplanes with SN 4698102 and above where the location of the steering pads and rollers was not consistent due to variances in the tolerance stack up. The alignment could be adjusted by machining the faces of the steering pads to achieve the necessary dimensional relationship between the pads and rollers. The accident airplane steering horn was reworked at the factory prior to delivery to align the pad faces with the rollers.

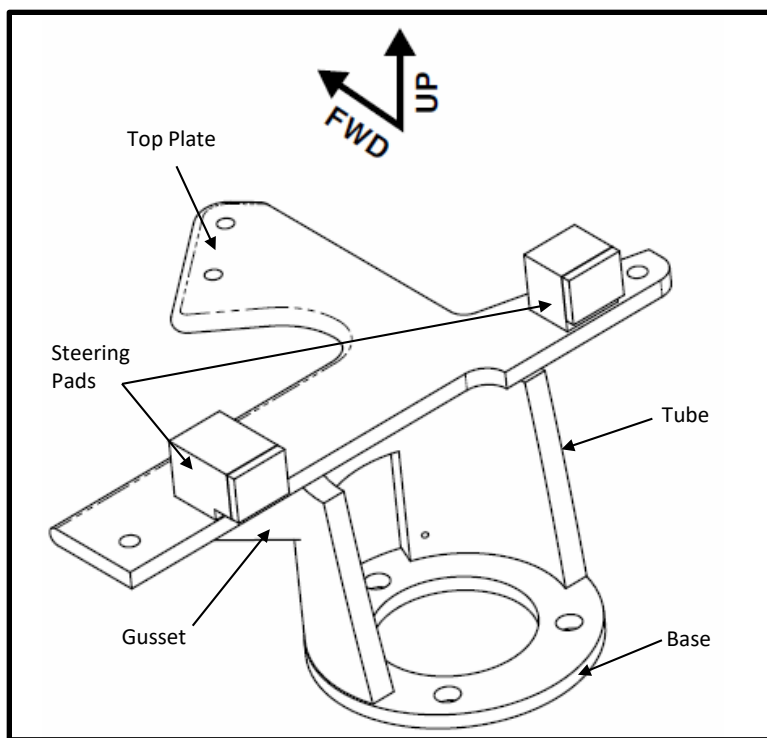


Figure 11-Drawing of Steering Horn Assembly.

Starting at SN 4698136 the nose wheel steering horn and roller assembly was changed with the issuance of PN 46N32A009-001. The new assembly utilized a horn assembly with PN 85154-014. The overall design of the steering horn assembly did not change, however, the tolerances on certain critical dimensions were tightened. The design and PN of the top plate, steering pads, gusset, and tube did not change with the new design. The overall location of the steering pads did not change with the new design, but the pad faces were deemed critical dimensions and an allowance was made for machining to meet the critical dimensions. The roller attach hole sizes and locations were also deemed critical and more tightly controlled. The overall size of the base did not change, but the PN changed to 85154-015 and the size and location of the mounting holes were more tightly controlled. The new steering horn utilized updated rollers with new PNs where the size and hole locations were more tightly controlled.

6.2 Steering Horn Examination

The steering horn assembly from the accident airplane was shipped to the NTSB Materials Laboratory along with the NLG assembly for examination. There was deformation noted to the base and top plate and the left large roller was deformed forward. The fractured bolt head from the forward attach bolt remained attached to the tube by safety wire. The bolt head was removed, and the steering horn was shipped to Piper for a dimensional inspection. The following is a summary of the airplane manufacturer's inspection.

The accident steering horn assembly was PN 85154-012 that was manufactured in August 2019 and had the airplane SN 4698109 marked on it. The base (PN 85154-004) was visibly deformed down near the intersection with the tube and measured 0.0230-inch out of flatness. The forward hole measured 0.030-inch out of round maximum, the aft right hole measured 0.007-inch out of

round maximum, and the aft left hole measured 0.004-inch out of round maximum. The top plate (PN 85154-013) was visibly deformed and twisted and measured 0.0198-inch out of flatness. The maximum distance between the top plate and base measured 0.004-inch out of tolerance. The left (large) roller bolt was deformed forward such that the roller face was 8° forward of vertical. The left (large) roller and right (small) roller were measured within tolerance for all dimensions. The left steering pad (PN 85154-010) face measured 0.055-inch aft of the left (large) roller tangent line at its maximum due to the deformed roller bolt. The lateral location of the left steering pad could not be measured accurately due to the deformation of the top plate. The right steering pad face measured 0.004-inch aft of the right (small) roller tangent line. The right steering pad (PN 85154-011) measured 0.05-inch closer laterally to the center of the base than its maximum tolerance. The right roller hole location on the top plate measured 0.028-inch forward of its maximum tolerance. The left roller hole location on the top plate was measured to be 0.092-inch forward of its maximum tolerance. All other dimensions were within the drawing tolerances.

6.3 Recorded Flight Data

The Garmin G3000 Integrated Avionics System on the airplane records certain flight parameters at a rate of 1 Hertz for each flight. A maintenance-oriented data set (CMC data) is recorded and stored internally in the unit. The airplane manufacturer defines a flight-oriented data set (log data) to be recorded directly to an SD card, when installed, that can be easily removed and analyzed. New data files are created each time the airplane power and avionics system are turned on, and the file naming convention provides the date and starting point (airport identifier) if a valid GPS signal is obtained. The CMC data can be retroactively retrieved by copying it to an SD card. Both the CMC and available log data were downloaded from the accident airplane after the accident. The CMC data included operations from December 5, 2019, to July 3, 2020, and the log data included operations from November 1, 2019, to July 3, 2020.

Piper plotted the altitude, groundspeed, heading, track, pitch and lateral acceleration data for the accident landing from the SD card at the request of the NTSB, Figure 12. The RMLG and LMLG touchdown points were established with the wheel speed information contained in the internal CMC data. The runway departure timing was estimated based on the airplane position information. The NLG touchdown can be estimated based on the pitch parameter. Shortly after MLG touchdown the heading and track begin to diverge indicating the airplane is in a skid which is confirmed with the increase in lateral acceleration. The touchdown speed was about 73 kts. The airplane departed the runway about 5 seconds after the RMLG touchdown at a ground speed about 58 kts. The pitch parameter was recorded for the entire time but exceeds the plotted limits in the graph after the airplane departs the runway and goes into an unusual attitude before coming to rest.

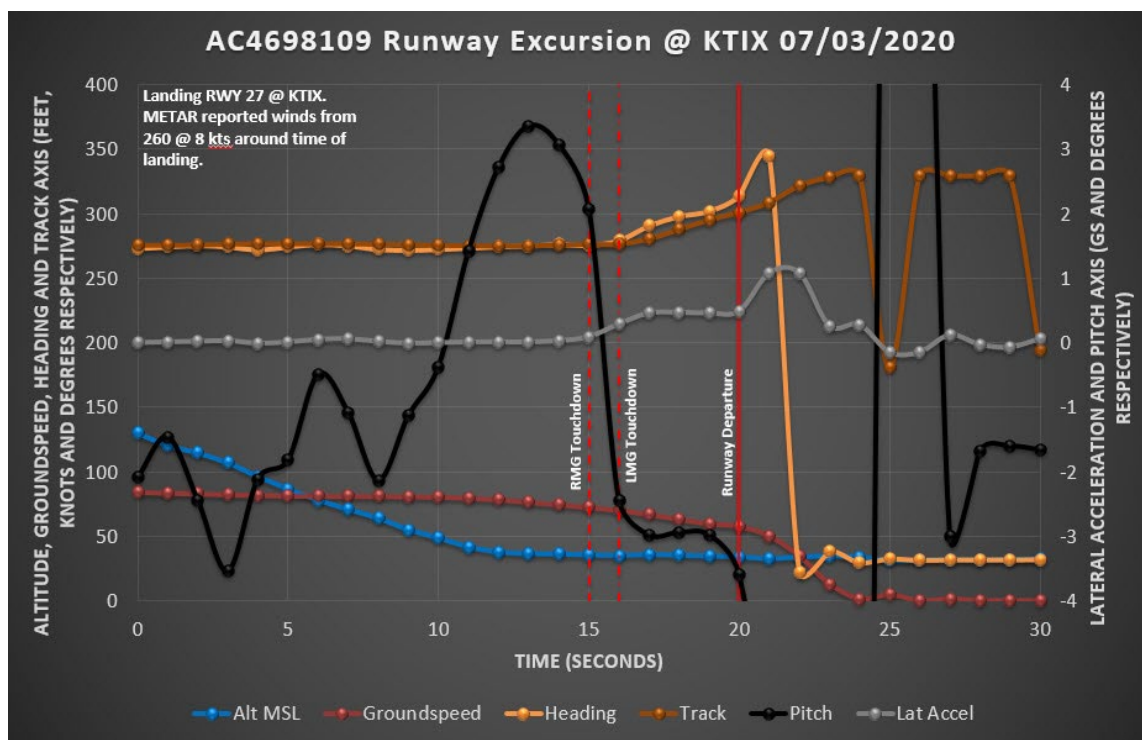


Figure 12-Plot of data from accident landing.

The accident airplane ground movements were examined for the flights on July 1 and the accident flight on July 3 after the maintenance was performed. The plotted ground movements are contained in Appendix B. The airplane started the first flight from TLH in front of the Flightline hangar and proceeded to runway 36 for takeoff. The airplane made a left 105° turn to enter the central ramp, a left 30° turn onto taxiway T, a left 60° turn onto taxiway A9, a right 90° turn onto taxiway A11, a left 90° turn onto taxiway A, a right 90° turn onto taxiway B, and a right 90° turn onto runway 36 before takeoff. The airplane landed on runway 25 at SPG, made a right 60° turn onto taxiway D2 and parked on the ramp.

The airplane started the second flight from SPG on the ramp and proceeded to runway 25 for takeoff. The airplane made a right 140° turn on the ramp, a left 80° turn onto taxiway D, a right 100° turn onto runway 18, a left 90° turn onto runway 7, and a right 180° turn to line up on runway 25 before takeoff. The airplane landed on runway 36 at TLH, made a right 30° turn onto taxiway A8, a right 150° turn onto taxiway A, a left 30° turn onto taxiway A9, a left 90° turn on taxiway T, a right 30° turn onto the ramp, and two right 90° turns on the ramp before parking.

The airplane started the third flight from TLH on the ramp in front of Flightline hangar and proceeded to runway 36 for takeoff. The airplane made a right 90° turn on the ramp, a left 30° turn onto taxiway T, a left 80° turn onto taxiway A9, a right 20° turn to continue on taxiway A9, a right 90° turn onto taxiway A11, a left 90° turn onto taxiway A, a right 90° turn onto taxiway B, and a right 90° turn onto runway 36 before takeoff. The airplane landed on runway 25 at SPG, made a right 110° turn onto taxiway D2, a left 180° turn on the ramp, and parked.

The airplane started the fourth flight, the accident flight, from SPG on July 3 on the ramp and

proceeded to runway 25 for takeoff. The airplane made a right 70° turn on the ramp, a left 50° turn onto taxiway D, a right 80° turn onto runway 18, a left 80° turn onto runway 7, and a right 180° turn to line up on runway 25 before takeoff.

6.4 Piper Tow Test

To support the investigation, the airplane manufacturer performed a simulated tow test to document the interference points in the NLG steering system, the witness marks created, the failure sequence of the bolts, and the forces required. A production engine mount with a production NLG assembly was mounted in a fixture for the test. The steering arm was attached to its mounting point on the engine mount and the steering horn was attached to the NLG strut. The NLG wheel and steering bungee were not installed for the test. The NLG strut extension was set to its nominal, properly serviced position with 2.6 inches of chrome showing. A metal bar was affixed to the NLG axle to provide a moment arm for the test and the external force was applied 44.125 inches from the center of rotation of the strut.

The NLG strut was rotated left until the steering arm left flange aft face was in contact with the steering arm mount plate on the engine mount. The simulated left turning force was increased to about 194 pounds producing a moment about 8,560 in-lb when the aft left bolt attaching the steering horn to the strut fractured. There was a slight separation between the aft left portion of the steering horn base and the strut, but the NLG was still steerable from the steering arm through the steering horn. The force was reapplied to about 144 lb producing a moment about 6,354 in-lb when the aft right bolt fractured. There was a larger separation between the aft portion of the steering horn base and the strut, and the steering horn base was visibly deformed. The NLG was still somewhat steerable from the steering arm through the steering horn, but the inputs required to achieve rotation of the NLG strut increased substantially. The force was reapplied to about 35 pounds producing a moment about 1,544 in-lb when the forward bolt fractured, and the steering horn was completely separated from the strut. Examination of the steering arm left flange aft face after the test showed a witness mark where the steering arm contacted the engine mount, Figure 13.

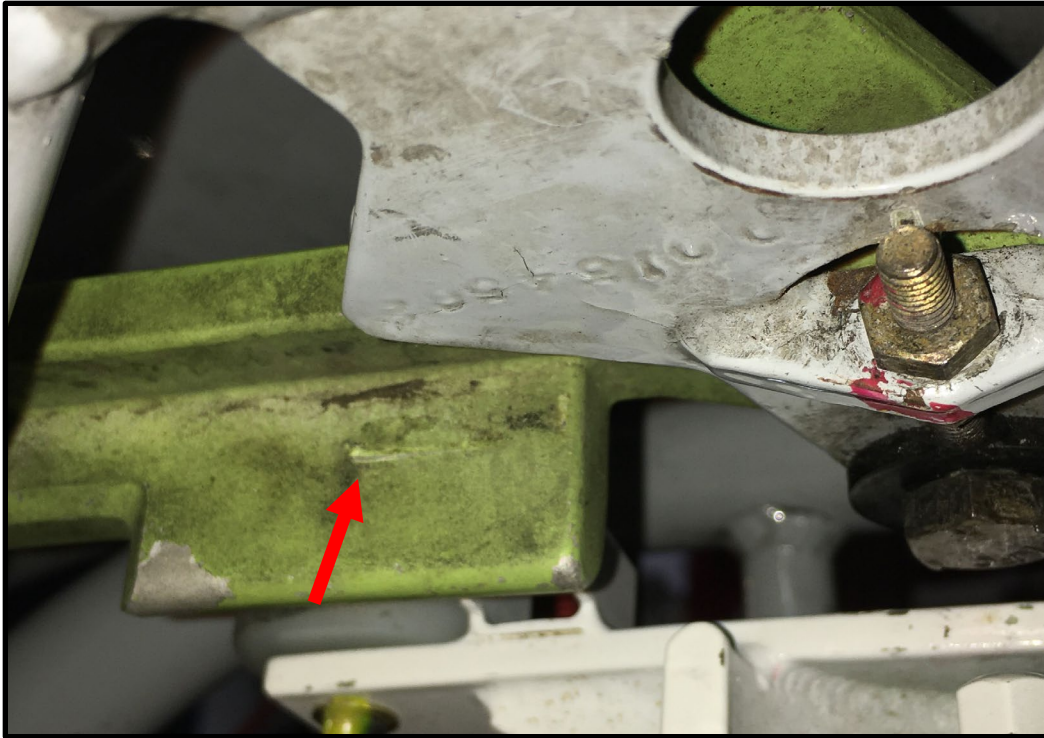


Figure 13-Witness mark on left aft face of steering arm after test.

7.0 Piper Published Service Information

After the accident, on July 24, 2020, Piper issued Service Letter (SL) 1285 Proper Tire Pressure Maintenance. The SL affected all models of the PA-46 airplane and for the PA-46-600TP increased the tire pressures. The NLG tire pressures increased from 88 psi to 88-92 psi unloaded and 92-97 loaded. The MLG tire pressures increased from 95 psi to 95-99 psi unloaded and 99-104 psi loaded. SL 1285A was issued on January 12, 2021, to supersede SL 1285 and added information on replacement placards and a revision to the Pilot's Operating Handbook (POH). The increased tire pressures remained the same in SL 1285A.

Piper issued SL 1286 Nose Landing Gear Steering Components Inspection and Adjustment on August 18, 2020, applicable to all PA-46 airplanes. The SL highlighted existing Airplane Maintenance Manual (AMM) procedures for NLG alignment, NLG rake angle adjustment, and rudder cable tension and updated the procedures for measuring and adjusting the clearance between the NLG steering arm and steering horn rollers. It recommended compliance within 50 hours and recurring inspection every 100 hours. SL 1286A was issued on January 21, 2021, to supersede SL 1286 for all PA-46 airplanes and contained updated nose landing gear alignment procedures for the M600 airplanes. The recommended compliance remained the same as the original, but it recommended compliance at the next scheduled maintenance visit for M600 airplanes. SL 1286B was issued on January 28, 2021, for all PA-46 airplanes to supersede SL 1286A and added new information on rigging of the rudder-aileron interconnect for M600 airplanes. The recommended compliance remained the same as the original, but it recommended compliance at the next scheduled maintenance visit for M600 airplanes that were compliant with SL 1286 and prior to further flight for M600 airplanes that were compliant with SL 1286A. SL 1286C was issued on

March 24, 2021, to supersede SL 1286B and contained clarification of the procedures to check and adjust the clearance between the NLG steering arm and steering horn rollers and the NLG alignment. The recommended compliance remained the same as the original, but it recommended no further action until the next recurring action for M600 airplanes that already complied with SL 1286B, compliance before further flight for M600 airplanes that already complied with SL 1286A, and compliance at the next maintenance visit for M600 airplanes that already complied with SL 1286.

Piper issued Service Bulletin (SB) 1350 Nose Landing Gear Steering Horn and Arm Assemblies Inspection on December 17, 2020, applicable to 3 specific M350 airplanes, 4 specific M500 airplanes, and M600 airplanes with SN 4698100 through SN 4698135. Piper considered compliance with the SB mandatory at the next maintenance visit but not to exceed 50 hours. The SB called for inspection of the steering horn and steering arm and replacement, if necessary. The aim of the SB was to make the affected airplanes compliant with the updated alignment requirements between the steering horn pads and rollers in accordance with the updated steering horn design discussed above. SB 1350A was issued on February 10, 2021, to supersede SB 1350 for the same affected airplanes and updated the torque of the bolts that attach the steering horn to the NLG strut from 25-30 in-lb to 60-75 in-lb.