



Aviation Investigation Final Report

Location:	Bignell, Nebraska	Accident Number:	CEN23FA031
Date & Time:	November 9, 2022, 09:34 Local	Registration:	N234PM
Aircraft:	Piper PA46-500TP	Aircraft Damage:	Destroyed
Defining Event:	Loss of control in flight	Injuries:	2 Fatal
Flight Conducted Under:	Part 91: General aviation - Business		

Analysis

The pilot obtained a preflight weather briefing about 2.5 hours before departing on an instrument flight rules (IFR) cross-country flight. Automatic dependent surveillance-broadcast (ADS-B) and weather data indicated the flight encountered low IFR (LIFR) conditions during the approach to the destination airport. These conditions included low ceilings, low visibility, localized areas of freezing precipitation, low-level turbulence and wind shear. The ADS-B data revealed that during the last minute of data, the airplane's descent rate increased from 500 ft per minute to 3,000 ft per minute. In the last 30 seconds of the flight the airplane entered a 2,000 ft per minute climb followed by a descent that exceeded 5,000 ft per minute. The last data point was located about 1,000 ft from the accident site. There were no witnesses to the accident.

A postaccident examination of the airframe and engine revealed no evidence of mechanical malfunctions or failures that would have precluded normal operation. The airplane's flight instruments and avionics were destroyed during the accident and were unable to be functionally tested. The rapid ascents and descents near the end of the flight track were consistent with a pilot who was experiencing spatial disorientation, which resulted in a loss of control and high-speed impact with terrain.

The pilot purchased the airplane about 3 weeks before the accident and received about 15 hours of transition training in the airplane, including 1 hour of actual instrument conditions during high-altitude training. The pilot's logbook indicated he had 5.2 hours of actual instrument flight time.

At the time of the pilot's weather briefing, the destination airport was reporting marginal visual flight rules (MVFR) conditions with the terminal area forecast (TAF) in agreement, with MVFR

conditions expected to prevail through the period of the accident flight. LIFR conditions were reported about 40 minutes before the airplane's departure and continued to the time of the accident. Light freezing precipitation was reported intermittently before and after the accident, which was not included in the TAF. The destination airport's automated surface observing system (ASOS) reported LIFR conditions with overcast ceilings at 300 ft above ground level (agl) and light freezing drizzle at the time of the accident. Low-level turbulence and wind shear were detected, which indicated a high probability of a moderate or greater turbulence layer between 3,600 and 5,500 ft mean sea level (msl) in the clouds. During the approach, the airplane was in instrument meteorological conditions with a high probability of encountering moderate and greater turbulence, with above freezing temperatures.

The National Weather Service (NWS) had issued conflicting weather information during the accident time period. The pilot's weather briefing indicated predominately MVFR conditions reported and forecasted by the TAFs along the route of flight, while both the NWS Aviation Weather Center (AWC) AIRMET (G-AIRMET) and the Graphic Forecast for Aviation (GFA) were depicting IFR conditions over the destination airport at the time of the briefing. The TAFs, G-AIRMET, and Current Icing Product (CIP)/Forecast Icing Products (FIP) were not indicating any forecast for icing conditions or freezing precipitation surrounding the accident time.

The pilot reviewed the TAF in his briefing, expecting MVFR conditions to prevail at his expected time of arrival. The TAF was amended twice between the period of his briefing and the time of the accident to indicate IFR to LIFR conditions with no mention of any potential freezing precipitation or low-level wind shear (LLWS) during the period.

Given the pilot's low actual instrument experience, minimal amount of flight experience in the accident airplane, and the instrument conditions encountered during the approach with a high probability of moderate or greater turbulence, it is likely that the pilot experienced spatial disorientation and lost control of the airplane.

Probable Cause and Findings

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

The pilot's flight into low instrument flight rules conditions and turbulence, which resulted in spatial disorientation, loss of control, and an impact with terrain. Contributing to the accident was the pilot's lack of total instrument experience.

Findings

Personnel issues	Total instrument experience - Pilot
Personnel issues	Decision making/judgment - Pilot
Environmental issues	(general) - Effect on operation
Environmental issues	Low ceiling - Effect on personnel
Aircraft	(general) - Not attained/maintained
Personnel issues	Aircraft control - Pilot
Organizational issues	(general) - Flight service

Factual Information

History of Flight

Approach-IFR initial approach	Loss of control in flight (Defining event)
Uncontrolled descent	Collision with terr/obj (non-CFIT)

On November 9, 2022, about 0934 central standard time, a Piper PA46-500TP, N234PM, was destroyed when it was involved in an accident near Bignell, Nebraska. The pilot and passenger sustained fatal injuries. The airplane was operated as a Title 14 *Code of Federal Regulations* Part 91 business flight.

According to air traffic control information, the pilot established contact with Denver Air Route Traffic Control Center (ZDV), reported inbound to the North Platte Regional Airport (LBF), North Platte, Nebraska, and the controller issued the current altimeter setting. The controller asked the pilot for the preferred approach and he requested the instrument landing system (ILS) runway 30 approach. At the request of the pilot, the controller provided vectors to the approach and instructed the pilot to fly to a heading of 230°. The pilot requested to begin the descent, and the controller cleared the pilot to turn right to 280° and descend to 7,000 ft mean sea level (msl). The controller then instructed the pilot to descend to 5,000 ft msl and turn right heading 280°, maintain 5,000 ft msl until established on the ILS, and cleared the pilot for the ILS runway 30 approach. In the same clearance and without receiving a proper read back, the controller instructed the pilot to report the cancellation of his instrument flight plan and change radio frequencies to the LBF common traffic advisory frequency. After a position change with controllers, the relieving controller reported the airplane overdue, and an alert notice (ALNOT) was issued.

A review of the ADS-B data revealed that during the last minute of data, the airplane's vertical descent rate increased from 500 ft per minute to 3,000 ft per minute. In the last 30 seconds, the vertical rate increased to a climb of 2,000 ft per minute, and then sharply decreased to a left descending turn exceeding 5,000 ft per minute. The last data point was located about 1,000 ft west-northwest of the accident site (see Figures 1 and 2).

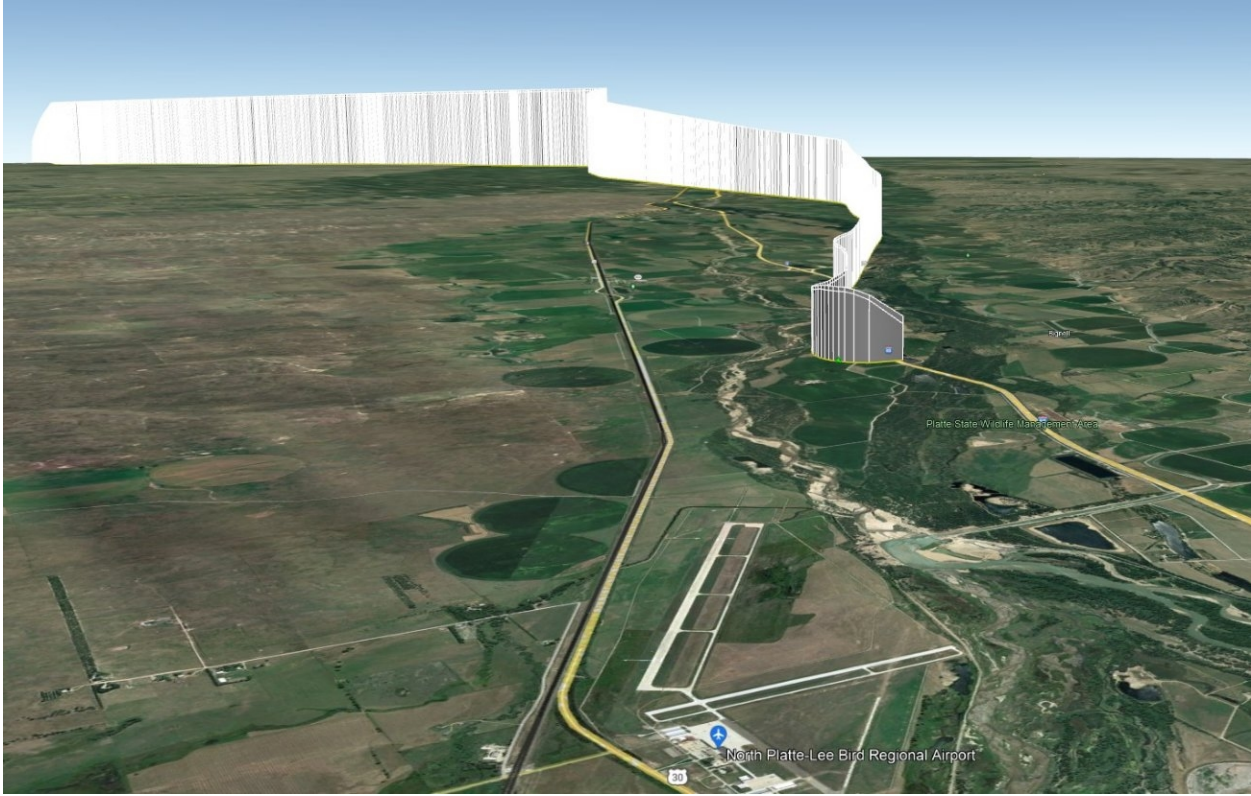


Figure 1. ADS-B flight track view looking east-southeast.

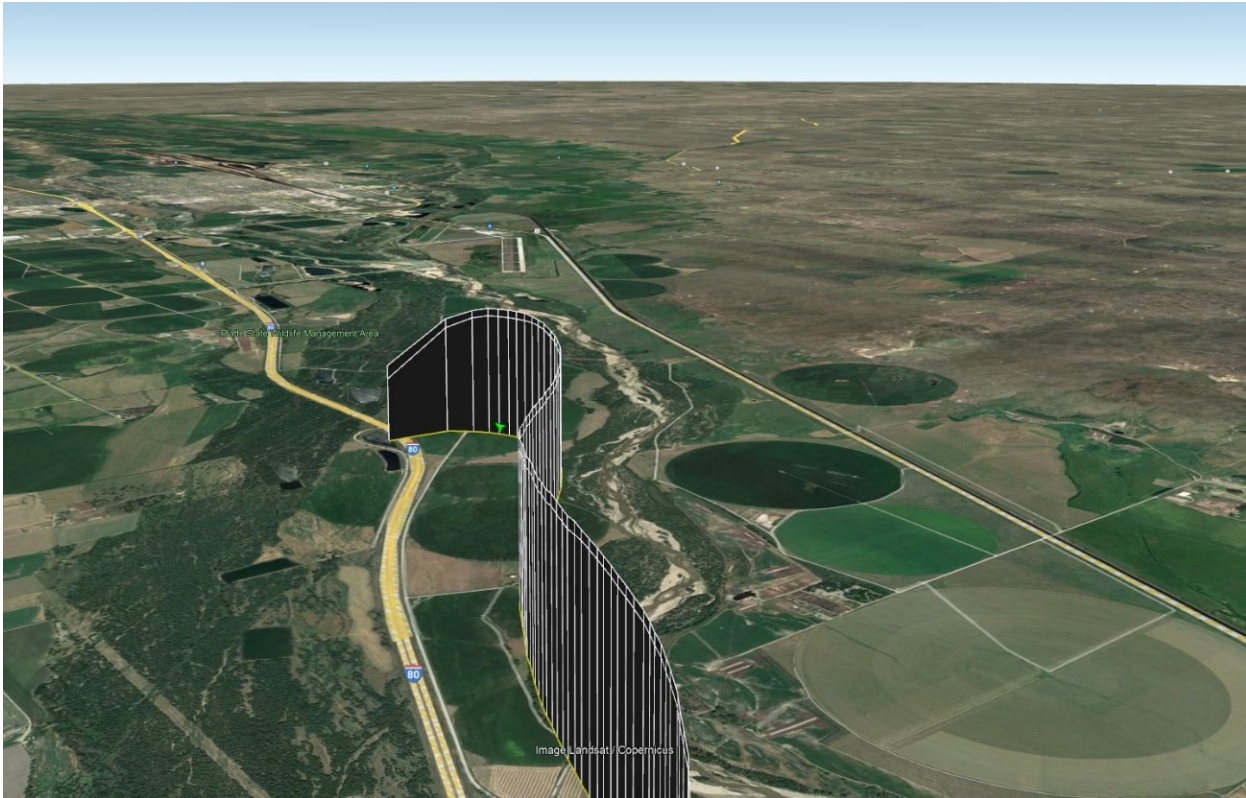


Figure 2. ADS-B flight track view looking west-northwest.

About 3 miles southeast of LBF, a resident noticed smoke coming from a field and contacted the local fire department. Local authorities responded to the area and reported the airplane accident. There were no witnesses to the accident.

Pilot Information

Certificate:	Private	Age:	41, Male
Airplane Rating(s):	Single-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	4-point
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	Yes
Medical Certification:	Class 3 Without waivers/limitations	Last FAA Medical Exam:	October 20, 2020
Occupational Pilot:	No	Last Flight Review or Equivalent:	October 26, 2022
Flight Time:	(Estimated) 505.3 hours (Total, all aircraft), 24.5 hours (Total, this make and model), 414.5 hours (Pilot In Command, all aircraft), 104.9 hours (Last 90 days, all aircraft), 30.9 hours (Last 30 days, all aircraft)		

A flight instructor who recently provided instruction to the pilot reported that the pilot had purchased the airplane about 3 weeks before the accident. Between October 23, 2022, and October 28, 2022, the instructor and the pilot completed 10 hours of ground instruction and 15.1 hours of flight instruction in the accident airplane. The instructor gave the pilot a low average score at the completion of the training. Between the completion of the training and the accident the pilot had logged 9.4 hours in the accident airplane.

The pilot's logbook, which was in the main wreckage, revealed that the pilot had accumulated 505.3 total flight hours, of which 24.5 hours were in the accident airplane. Of the 505.3 hours, the pilot logged 5.2 hours of actual instrument flight time, of which 1.0 hour was in the accident airplane. The instructor reported the 1.0 hour of actual instrument time in the accident airplane was an encounter with IFR conditions during high-altitude training.

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N234PM
Model/Series:	PA46-500TP	Aircraft Category:	Airplane
Year of Manufacture:	2005	Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	4697200
Landing Gear Type:	Retractable - Tricycle	Seats:	6
Date/Type of Last Inspection:	August 1, 2022 Annual	Certified Max Gross Wt.:	4892 lbs
Time Since Last Inspection:		Engines:	1 Turbo prop
Airframe Total Time:	649.5 Hrs as of last inspection	Engine Manufacturer:	Pratt & Whitney Canada
ELT:	Installed, not activated	Engine Model/Series:	PT-6A-42A
Registered Owner:	On file	Rated Power:	500 Horsepower
Operator:	On file	Operating Certificate(s) Held:	None

The accident airplane was equipped with avionics that included a Meggitt Magic six-screen electronic flight display, a Bendix KMD 850 multi-function display, Meggitt Magic 1500 autopilot/flight director, and a Garmin GNS 430W GPS/WAAS navigation system.

The flight instructor noted some discrepancies with the avionics components when he was completing his training with the accident pilot, including coupling an area navigation (RNAV) approach with the autopilot. The accident pilot had planned to complete an avionics upgrade

scheduled for January 2023. The instructor recommended the pilot fly only ground-based approaches until the upgraded system was installed.

Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument (IMC)	Condition of Light:	Day
Observation Facility, Elevation:	KLBF, 2762 ft msl	Distance from Accident Site:	3 Nautical Miles
Observation Time:	09:46 Local	Direction from Accident Site:	314°
Lowest Cloud Condition:		Visibility	4 miles
Lowest Ceiling:	Overcast / 300 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	8 knots /	Turbulence Type Forecast/Actual:	/
Wind Direction:	30°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29.93 inches Hg	Temperature/Dew Point:	-1°C / -2°C
Precipitation and Obscuration:	Moderate - None - Mist		
Departure Point:	Lincoln, NE (KLNK)	Type of Flight Plan Filed:	IFR
Destination:	North Platte, NE (LBF)	Type of Clearance:	IFR
Departure Time:	08:33 Local	Type of Airspace:	Class E

The accident pilot obtained a preflight weather briefing and filed an IFR flight plan at 0604, with an estimated departure of 0730 for a direct route to LBF at a planned altitude of 16,000 ft msl, with an alternate airport of Lexington, Nebraska. The standard route briefing provided the current hazards as a G-AIRMET for IFR and LLWS conditions extending over the route and accident site. The freezing level was noted between 8,000 and 12,000 ft msl over the route, with no icing expected below 16,000 ft msl. The briefing included Meteorological Aerodrome Report (METARs) for LBF and for other airports along the route from 0353 and 0553, and the TAF issued for LBF at 0832.

The initial TAF for LBF, issued at 0538 and used by the pilot in his preflight weather briefing indicated that MVFR conditions were expected to prevail through 1200 with north-northwesterly winds. After 1200, VFR conditions were expected to prevail with southerly winds gusting to 28 kts. The forecast did not include any forecast for LLWS. The TAF was amended at 0800 with LIFR conditions expected to prevail with an overcast ceiling at 300 ft agl through 1200.

A review of the ASOS observations for LBF indicated that a cold front moved through the area after 0100 and was followed by MVFR ceilings lowering conditions to IFR at 0624, which was after the pilot obtained a preflight weather briefing. At the time of the briefing, LBF was reporting MVFR conditions with the TAF in agreement, with MVFR expected to prevail during the planned flight. LIFR conditions were reported about 40 minutes before the flight's

departure from LNK at 0832 and continued through the time of the accident. Light freezing precipitation was reported intermittently before and after the accident, which was not included in the TAF or other graphic forecasts. The surface temperatures had dropped below freezing 3 hours before the accident and had been above freezing during the night and into the early morning hours, and thus the ground was not frozen and retained some residual heat. The LBF ASOS reported LIFR conditions with overcast ceilings at 300 ft agl and light freezing drizzle at the time of the accident due to below freezing temperatures at the surface.

The High-Resolution Rapid Refresh (HRRR) sounding for 0900 was plotted using the Universal Rawinsonde Observation (RAOB) analysis program. The program indicated a high potential for moderate or greater turbulence between 3,600 and 5,500 ft msl in the inversion where the sounding identified strong wind shear. The National Weather Service (NWS) did not have any current advisories for turbulence and had a G-AIRMET current for LLWS with a 20 kt change in wind speed within 2,000 ft of the surface.

The NWS Graphic Forecast for Aviation (GFA) provides a forecast for the en route phase of flight and for locations without a TAF. The GFA 6-hour forecast issued about 0400 and available at the time of the pilot's preflight briefing depicted easterly winds at 10 to 15 kts over the region with visibility unrestricted, while a G-AIRMET for IFR conditions extended over the area. The GFA cloud forecast depicted overcast clouds with bases at 3,500 ft msl and tops between 7,000 and 8,000 ft msl.

The NWS AWC CIP about 0600 depicted the potential for light icing over extreme northwest Nebraska and a trace of ice immediately north of the accident site with little to no supercooled large droplets (SLD) expected over the accident site. The NWS AWC 3-hour FIP depicted no icing conditions over the accident site.

During the time period surrounding the accident, the NWS had no SIGMETs, Convective SIGMETs, or Center Weather Advisories (CWA's) current for the area. The NWS did have G-AIRMETs current for IFR conditions and LLWS below 2,000 ft agl. There were no G-AIRMETs current for icing over the route of flight.

A pilot operating a Cessna 208 for a regional freight carrier from Omaha, Nebraska, to LBF, was following the accident airplane on the instrument approach. The pilot recalled the LBF weather being reported as a ceiling near 200 ft with visibility 1 to 2 miles with occasional freezing rain. He indicated the cloud tops were between 7,500 ft to 7,900 ft with cumulus type clouds and anticipated a turbulent approach with potential icing and a tailwind landing on runway 30. The pilot categorized the approach as "very demanding." After the accident airplane could not be accounted for in front of him, the pilot made two loops in a holding pattern and then diverted to another airport to the south due to reported light freezing precipitation. The pilot reported that the TAFs he received were somewhat behind the actual reported weather conditions and did not reflect the actual conditions until after 1200. He indicated he thought the front had moved through faster than expected.

Airport Information

Airport:	NORTH PLATTE RGNL/LEE BIRD FLD LBF	Runway Surface Type:	
Airport Elevation:	2777 ft msl	Runway Surface Condition:	
Runway Used:		IFR Approach:	ILS
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 Fatal	Aircraft Damage:	Destroyed
Passenger Injuries:	1 Fatal	Aircraft Fire:	On-ground
Ground Injuries:		Aircraft Explosion:	None
Total Injuries:	2 Fatal	Latitude, Longitude:	41.081515,-100.61329(est)

Postaccident examination of the accident site revealed the airplane impacted terrain on the bank of an irrigation reservoir. A postimpact fire partially consumed the airplane. The main wreckage, which consisted of the engine, fuselage, and empennage, came to rest within the initial impact area. Fragmented airplane structure was located within a 50 ft diameter of the main wreckage. The engine and propeller assembly were embedded in the terrain, followed by the cockpit, cabin, and empennage. The left and right wings came to rest adjacent to the main wreckage (see Figures 3 and 4). The airplane's flight instruments and avionics were destroyed by impact and thermal damage. The airplane's landing gear and flaps were in the retracted position. The airplane's fuel system was destroyed, and there was a fuel odor and fuel sheen on the water surface at the accident location.



Figure 3. Aerial view of accident location (Source: Nebraska State Patrol)



Figure 4. Accident main wreckage (Source: Piper Aircraft, Inc.)

Flight control continuity could not be established due to airplane fragmentation and recovery operations; however, all cable and flight control separations were consistent with the impact sequence or recovery operations.

The pitot tube, which was separated from the wing structure, was tested with a slave battery and cables. When battery power was applied to the pitot heat terminals, the tube heated and no anomalies were noted.

The engine compressor and turbine module housings displayed torsional deformation, and the compressor blades were all separated at the blade roots. The exhaust tubes exhibited ductile crush damage. The four-blade propeller assembly hub was fragmented. The propeller blades displayed chordwise scratching, leading edge gouging, and twist deformation in the direction of rotation.

No preimpact mechanical malfunctions or failures were noted that would have precluded normal operation of the airplane.

Medical and Pathological Information

An autopsy of the pilot was performed by Western Pathology Consultants, PC, Scottsbluff, Nebraska, which listed the cause of death as “multiple blunt force injuries.”

The Federal Aviation Administration Civil Aerospace Medical Institute Bioaeronautical Sciences Research Branch, Forensic Sciences, performed toxicology testing of postmortem specimens from the pilot. The results were negative for all tests conducted.

Additional Information

The Federal Aviation Administration Civil Aerospace Medical Institute’s publication, “Introduction to Aviation Physiology,” defines spatial disorientation as a “loss of proper bearings; state of mental confusion as to position, location, or movement relative to the position of the earth.” Factors contributing to spatial disorientation include changes in acceleration, flight in IFR conditions, and unperceived changes in aircraft attitude. The FAA’s *Airplane Flying Handbook* (FAA-H-8083-3C) describes some hazards associated with flying when the ground and horizon are obscured. The Handbook states, in part, the following:

Spatial disorientation has been a significant factor in many airplane upset accidents. Accident data from 2008 to 2013 shows nearly 200 accidents associated with spatial disorientation with more than 70% of those being fatal. All pilots are susceptible to false sensory illusions while flying at night or in certain weather conditions. These illusions can lead to a conflict between actual attitude indications and what the pilot senses is the correct attitude. Disoriented pilots may not always be aware of their orientation error. Many airplane upsets occur while the pilot is engaged in some task that takes attention away from the flight instruments or outside references. Others perceive a conflict between bodily senses and the flight instruments and allow the airplane to divert from the desired flightpath because they cannot resolve the conflict.

Administrative Information

Investigator In Charge (IIC):	Sauer, Aaron
Additional Participating Persons:	Jerome Sveeggen; FAA; Lincoln, NE Jonathon Hirsch; Piper Aircraft, Inc.; Vero Beach, FL
Original Publish Date:	March 28, 2024
Last Revision Date:	
Investigation Class:	Class 3
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=106270

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