

NATIONAL TRANSPORTATION SAFETY BOARD

Vehicle Recorder Division

Washington, D.C. 20594

September 12, 2022

Global Positioning System Device

Specialist's Factual Report

By Sean Payne

1. EVENT SUMMARY

Location: Buckeye, AZ
Date: September 18, 2021
Aircraft: Swearingen SX300
Registration: N5SX
Operator: Private
NTSB Number: WPR21LA357

2. DETAILS OF INVESTIGATION

The National Transportation Safety Board (NTSB) Vehicle Recorder Division received the following global positioning system (GPS) device(s):

Device Manufacturer/Model:	Garmin GTN-750
Serial Number:	1ZA019269

2.1. Garmin GTN-750 Device Description

The Garmin GTN-750 is a panel-mounted GPS receiver featuring a 6.9-inch color liquid crystal (LCD) display. It has a GPS/SBAS engine and is TSO-C146c certified for primary domestic, oceanic, and remote navigation including en route, terminal, and non-precision approaches, and approaches with vertical guidance, such as LPV and LNA/VNAV. The unit can simultaneously give display approach information and weather and traffic data in relation to their position on a large, color moving map display. Its color moving map features a built-in database that shows cities, highways, railroads, rivers, lakes, and coastlines. The unit has a slot on the front for a Jeppesen database containing all airports, VORs, NDBs, Intersections, FSSs, Approaches, DPs/STARs and SUA information. A flight plan composed of multiple waypoints, including user-defined waypoints, can be programmed in the unit. The GTN-750 also includes a TSO approved airborne VHF communications transceiver and TSO approved airborne VOR/Localizer and Glideslope receivers. The unit contains an internal SD card storing flight log data, which can be accessed through the slot in the right side of the unit. If the unit is equipped with a firmware v6.50 or later, the internal SD card will store a limited set of flight data information.

2.2. Data Recovery

The device appeared largely undamaged. The device was booted in a desktop power station designed for Garmin devices. Through the unit's menus, an operation was selected that dumps flight logs from the device's internally mounted SD memory card was transferred to an externally accessible SD memory card on the front face of the unit. Flight logs were converted by the unit to comma separated value (.CSV) format.



Figure 1. Photo of the Garmin GTN-750 device.

2.3. Data Description

The unit exported data for approximately 104 powered log sessions beginning on October 21, 2020, and persistent to the date the accident occurred on September 18, 2021. Only the flight log for the accident flight was reviewed and discussed in this report.

2.4. Parameters Provided

Table 1 describes data parameters provided by the GPS device. Note that some parameters are derived, such as groundspeed, and other parameters are recorded to the device directly, such as AltGPS.

Table 1. Garmin GTN-750 Parameters.

Parameter Abbreviation	Description
Latitude	Latitude (degrees)
Longitude	Longitude (degrees)
AltMSL	Altitude above Mean Sea Level (feet)
OAT	Outside Air Temperature (degrees F)
GndSpd	Groundspeed (knots)
VSpd	Vertical Speed (feet per minute)
TRK	Track (degrees)
FQtyC	Fuel Quantity
AltGPS	GPS Altitude (feet)
HSIS	Horizontal Situation Indication Source (GPSS, VLOC, NAV)
CRS	Course (degrees)
NAV1	Active Navigation Frequency (MHz)
NAV2	Standby Navigation Frequency (MHz)
COM1	Active Communication Frequency (MHz)
COM2	Standby Communication Frequency (MHz)
HCDI	Horizontal Course Deviation Indicator
VCDI	Vertical Course Deviation Indicator
WndSped	Calculated Wind Speed (knots)
WptBrg	Bearing to Waypoint (degrees)
MagVar	Magnetic Variation (degrees)
GPSfix	GPS Fix Type (fix type)
HAL	Horizontal Alert Limit (meters)
HPLwas	Horizontal Protection Limit (meters)
HPLfd	Horizontal Protection Limit (meters)
VPLwas	Vertical Protection Limit (meters)
AltPress	Pressure Altitude (feet)
RAIMalarm	Receiver Autonomous Integrity Monitor Alarm (discrete)
RAIMfault	Receiver Autonomous Integrity Monitor (discrete)

2.5. OVERLAYS AND TABULAR DATA

All times are presented in local time (LCL).

Figure 2 is a graphical overlay generated using Google Earth for the entire accident flight. The weather and lighting conditions in Google Earth are not necessarily the weather and lighting conditions present at the time of the recording.

The figure is oriented north-up and depicts the aircraft's flight path after departing Gila Bend Municipal Airport (E63), Gila Bend, Arizona. The aircraft continued northwest of the airport as it maneuvered through mountainous terrain. Around 8:23:00 LCL, the aircraft climbed rapidly to a higher altitude and then entered a steady descent profile. The Garmin tracklogs end in close proximity to a road.

Figure 3 is a graphical overlay generated using Google Earth showing the aircraft's flight path as it traveled north through an area of mountainous terrain.

Figure 4 is a graphical overlay generated using Google Earth showing the aircraft's flightpath in an area of mountainous terrain just north of E63.

Figure 5 is a graphical overlay generated using Google Earth highlighting an area of the tracklog where the aircraft climbed rapidly to a higher altitude and then began a steady descent profile. Just prior to 8:23:00 LCL, the aircraft was traveling along terrain at a recorded altitude of between 1,300 and 1,500 feet MSL and a groundspeed of about 220 knots. Around 8:23:00, the aircraft rapidly climbed and reached an altitude of just under 2,500 feet MSL by 8:23:12. The aircraft began a descent, the GPS tracklog showed it maneuvered near terrain and ultimately toward a small road while descending. The tracklog ended in the vicinity of a road, the derived groundspeed at the time of the last data point was about 98 knots and the recorded MSL altitude was 1,143 feet.

Figure 6 is a graphical overlay generated using Google Earth highlighting the aircraft's final tracklog as recorded by the Garmin device. The last recorded data point was at 8:24:40 LCL with a derived groundspeed of about 98 knots and a recorded MSL altitude of 1,143 feet.

Tabular data used to generate figures 2 through 6 are included as Attachment 1. This attachment is provided in electronic comma-delimited (.CSV) format.

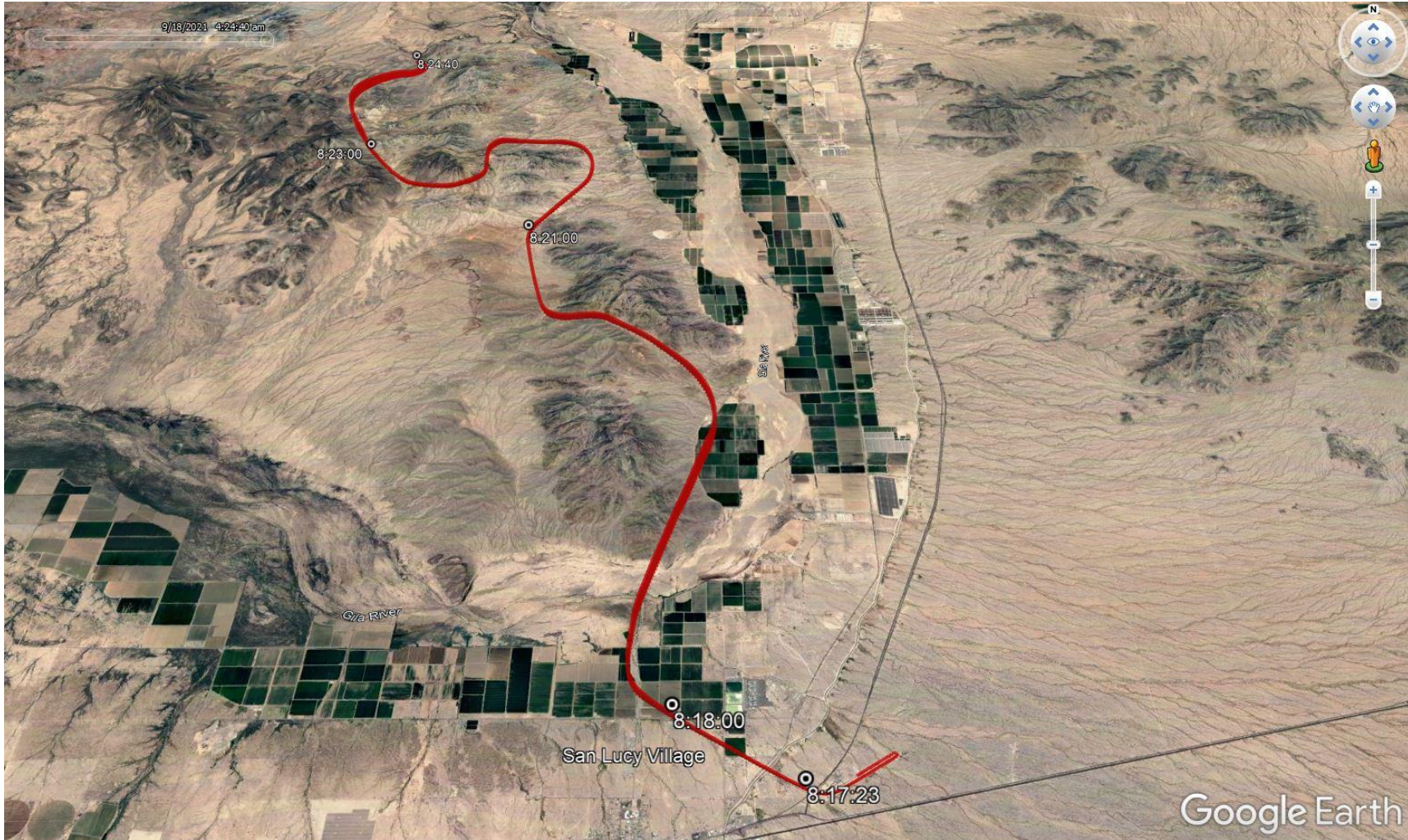


Figure 2. Google Earth overlay showing the entire tracklog file for the accident day.

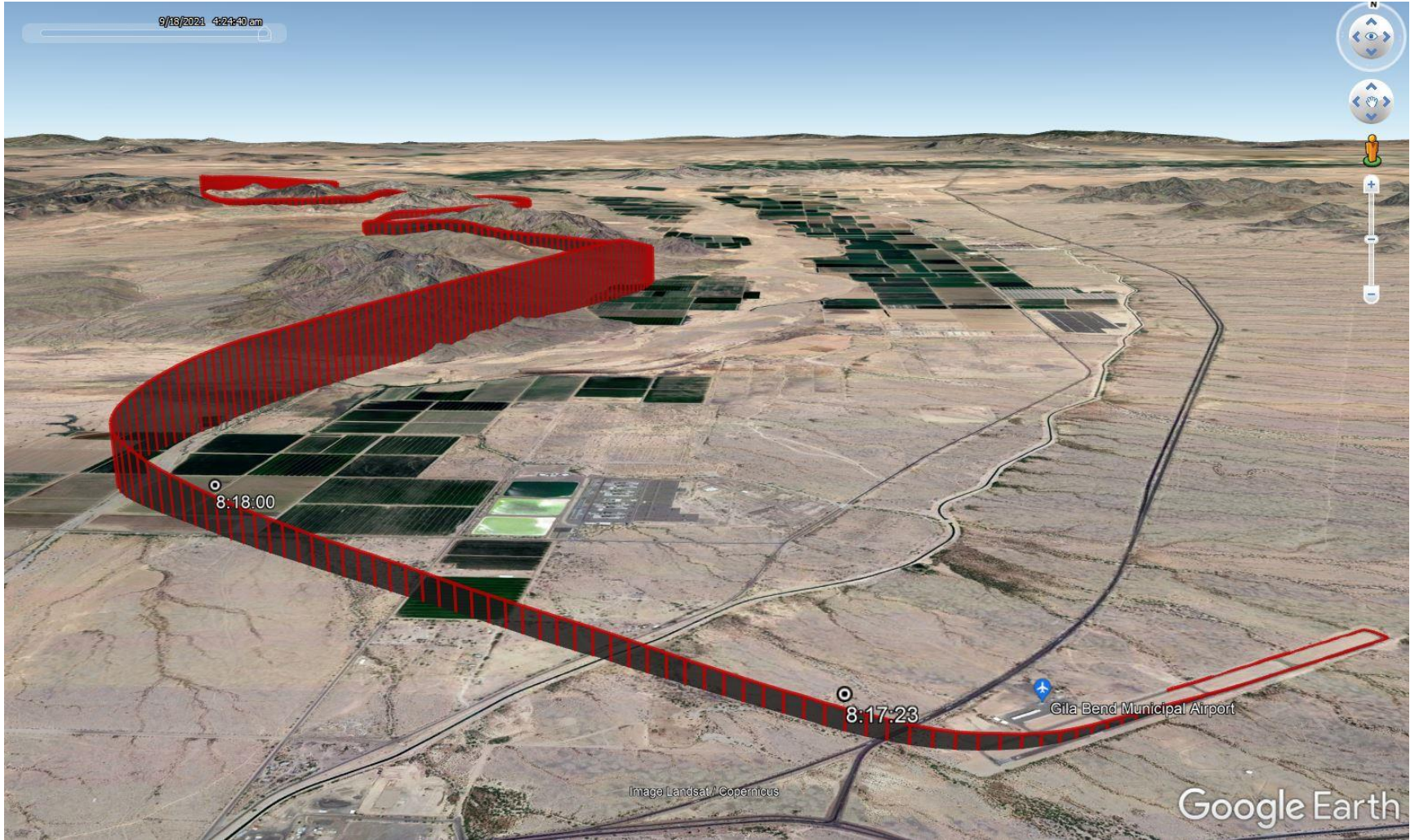


Figure 3. Google Earth overlay showing the aircraft's departure from E63.

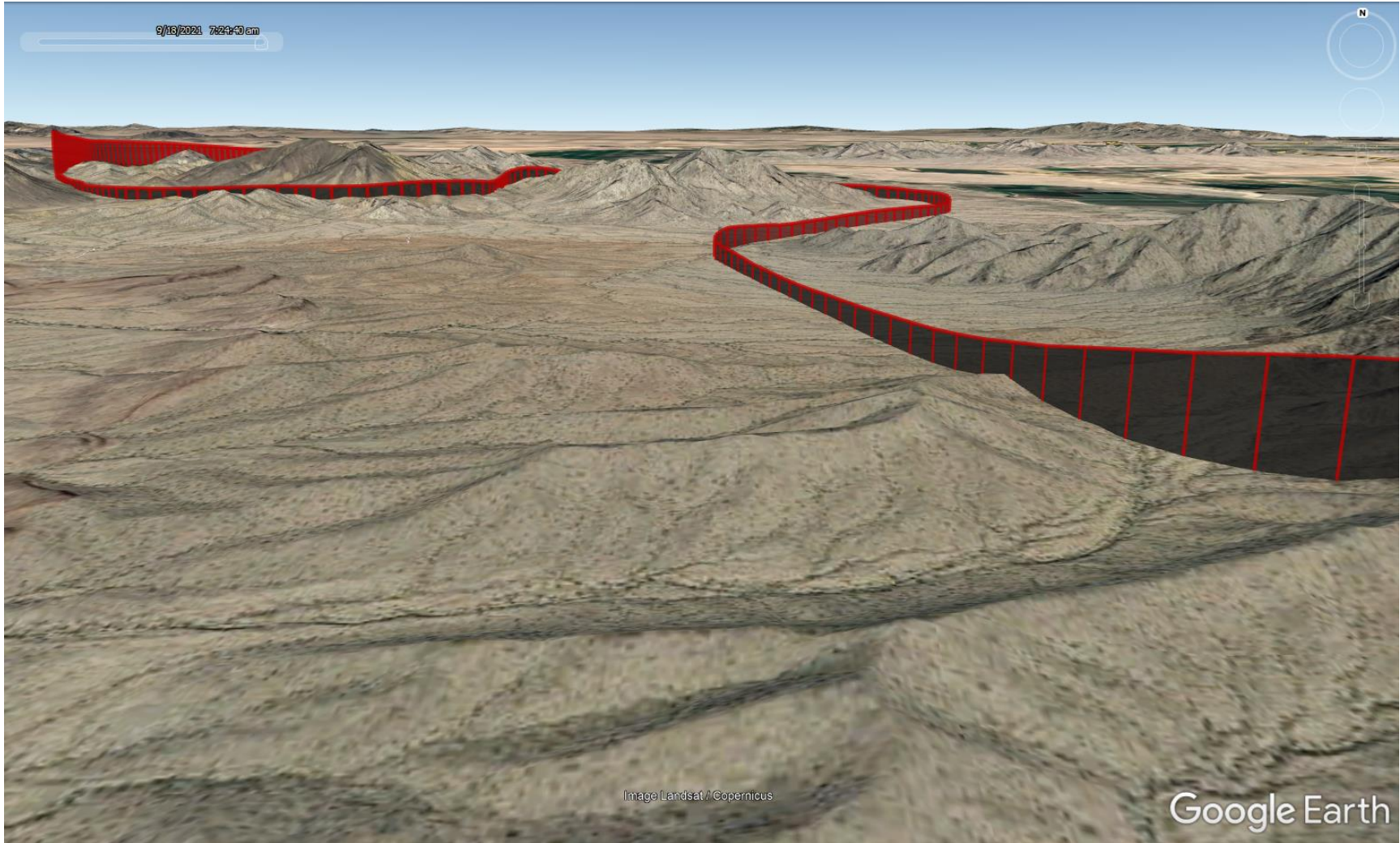


Figure 4. Google Earth overlay showing the aircraft's flightpath through terrain just north of E63.

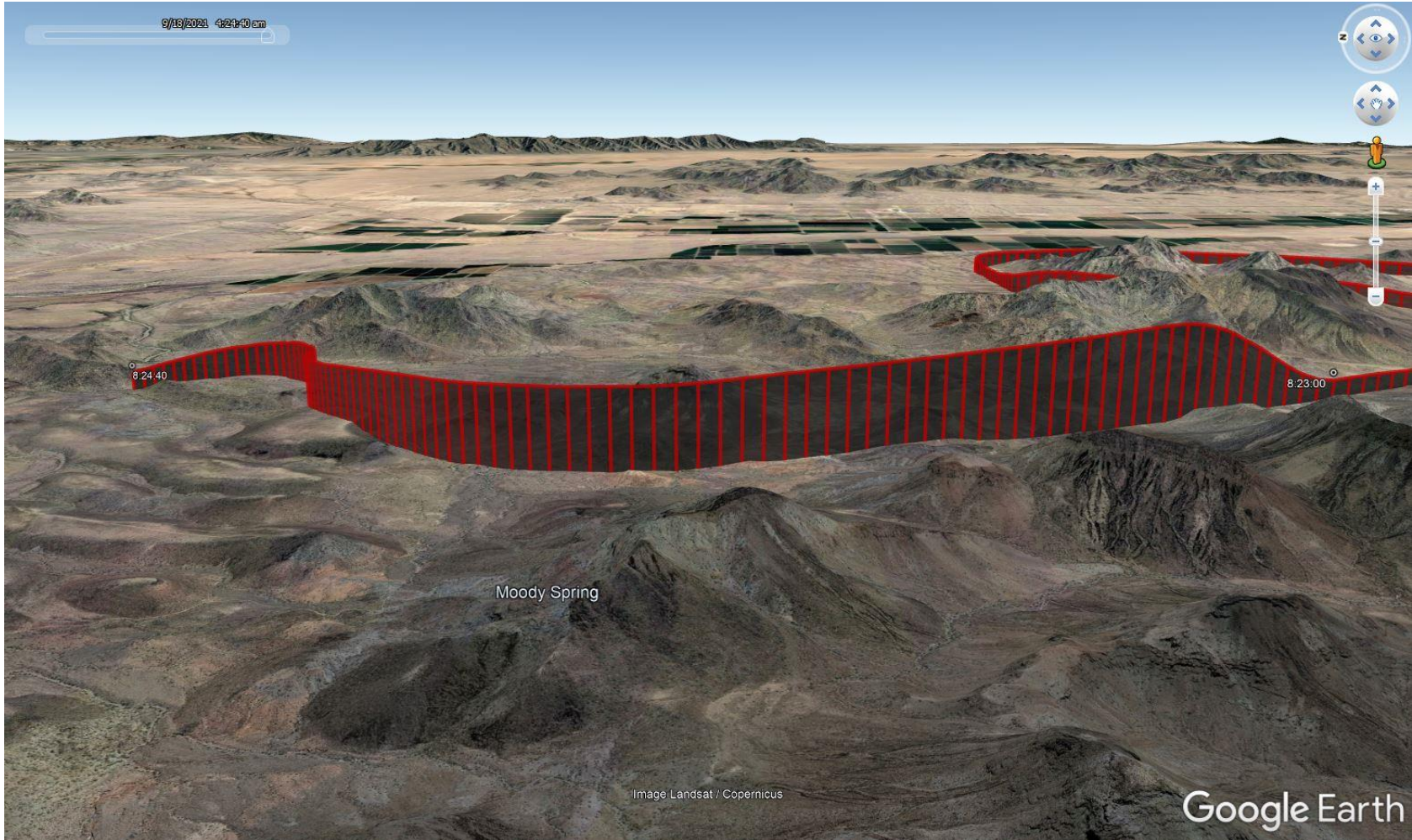


Figure 5. Google Earth overlay showing an area where the aircraft climbed rapidly and eventually approached terrain.



Figure 6. Google Earth overlay showing the final tracklog points of the aircraft's position in proximity to mountainous terrain and a road.