

No. 25

Alaska Airlines, Inc., Douglas DC-6A, N 6118C, accident at Shemya, Alaska, on 21 July 1961. Civil Aeronautics Board (USA) Aircraft Accident Report, File No. 1-0002, released 10 October 1962.

Circumstances

Flight CKA 779 was a contract cargo flight from Travis Air Force Base, California to Tachikawa, Japan, carrying six crew members. At 0211 hours Bering standard time, during the approach to a landing at Shemya, an en route refuelling stop, after descending through minimum weather conditions under the guidance of GCA (ground controlled approach) the aircraft crashed and burned about 200 ft short of the threshold of runway 10 on a course aligned with the runway. All persons aboard received fatal injuries.

Investigation and EvidenceThe Aircraft

At the time of the accident, the total time on the airframe was 10 600 hours. The last major inspection was conducted 146 hours prior to the accident.

The maximum weights for take-off and landing and the centre of gravity were within the permissible limits.

The Crew

The flight carried a crew of six - the captain, a co-captain, a co-pilot, one flight engineer with pilot certificate and two other flight engineers. All of them had valid licences and medical certificates, but the captain had no qualification for Shemya Airport. The captain had a total of 13 019 flying hours of which 1 118 were on the DC-6. The co-captain had flown 13 000 hours, and the co-pilot had 2 061 hours of experience of which 101 hours were on DC-6 equipment. The flight engineer had accumulated 1 176 hours

as a pilot. The crew was to alternate its duties in order that no one would become fatigued at his duty station and, as well as could be determined, this requirement was met.

The captain, co-pilot and flight engineer had flown this aircraft into Shemya Airport landing at 1 952 hours on 12 July 1961 and again at 1 024 hours on 14 July 1961. Both landings were accomplished after ground-controlled approaches in IFR weather conditions.

Weather situation

The accident took place at 0211 hours. At 0212 the U.S. Weather Bureau observer made the following observation:

"indefinite 200-foot variable ceiling; visibility 3/4 mile variable, fog; temperature 45°; dewpoint 45°, wind south-southeast 8 kt; altimeter setting 29.84; ceiling 100 ft variable to 300 ft, visibility 1/2 mile variable to one mile".

Slightly more than 500 ft above the runway the wind was south at 20 kt, while the surface wind was southeast at 8 kt.

Runway 10 - approach lights

Runway 10 is macadam and is 9 990 ft in length, 200 ft wide, and its elevation is 95 ft msl. There are six pairs of red approach lights extending 1 460 ft outward from the threshold. They are spaced at 200-foot intervals and are 200 ft apart in width. From the edge of the threshold pavement to a point 186 ft in the direction of an approaching aircraft, the ground slopes downward gradually at an

angle of about 1°. Then the ground drops suddenly at an angle of approximately 30° to a valley floor 50 to 60 ft below the level of the runway.

The six pairs of approach lights are mounted on poles of different heights to accommodate the variance in terrain height, but the lights themselves are practically on a level with the runway. A single strobe light (a condenser discharge flashing light rated at approximately 10 000 000 candle power) is located on the ground, aligned with the runway centre-line approximately 152 ft short of the runway threshold. There are two pairs of green threshold lights, each pair mounted side by side (crosswise to the runway), one pair at each corner of the runway. Thereafter, at 200-foot intervals, single runway lights extend the full length of the runway along both sides. All lights (except the strobe light) utilize 200-watt bulbs.

On the day following the accident it was discovered for the first time that an electric power cable lying along the side of the runway had been cut two days prior to the accident to allow construction vehicles to pass over the area. This cable was the powerline leading to the six pairs of red approach lights off the end of runway 10, as well as to two of the four green threshold lights, and to the first four pairs of runway lights. This condition was not reported by previous landing aircraft, nor was a Notice to Airmen concerning this irregularity issued by Northwest Airlines, the operator of the airport. The main rheostat, which controls all lighting intensity (except the strobe light), was set on maximum brightness during the flight's approach.

GCA

The GCA unit used at Shemya was an AN/FPN-33 Quad Radar. GCA approach weather minima at Shemya for Alaska Airlines flights are ceiling 200 ft and visibility 1/2 mile. The minima applicable to the captain for GCA at Shemya were

ceiling 400 ft and visibility 3/4 mile. The GCA equipment was given a complete functional check by the GCA maintenance man and the operator prior to its use on 20 July 1961, and was operating, according to them, within tolerances. During the 12-hour period preceding this flight's approach, six other aircraft had made successful GCA approaches to Shemya, using the same equipment manned by the same controller.

On 3 May 1961 and 12, 13, 14 and 15 July 1961, the GCA facility was flight-checked by the FAA and found to have been within tolerances. However, it was pointed out by the flight check crew in their report at the time of the latter flight check that,

"It would appear from personal examination that the present radar antenna system now in use ... has deteriorated and worn beyond its normal life and tolerances, and it is anticipated that it will be difficult to maintain within acceptable tolerances in the very near future."

Following the accident, on 22 and 24 July 1961 the facility was again flight-checked by the FAA and found within tolerances. The check pilot gave the controller a proficiency rating of "very good" on all of the checks.

The GCA controller

He had been employed as an air traffic controller for about nine years, eight of which included operation of GCA equipment. He had been operating the GCA equipment at Shemya since the summer of 1957, using the same equipment that was in operation at the time of this accident. His tours of duty on Shemya were continuous since 1957, but were for periods of 90 days, with a 90-day rest period in between. He was the only controller during each of his tours of duty. His then-current tour of duty began 18 April 1961, and he was scheduled to begin a rest period on 1 August 1961. He stated that he conducted an average of

100 to 130 instrument approaches to Shemya per month. Flight CKA 779 was the 83rd GCA approach that he had conducted since 20 June 1961. The types of aircraft controlled during these approaches had been U.S. military as well as U.S. civil aircraft. The radar installation at Shemya is unique in that it is the only privately-owned and operated facility of its kind serving U.S. civil air carriers. The radar operator need not be certificated by FAA, nor need he demonstrate his continued competence to perform his assigned control functions, nor is he required to undergo recurrent training such as is required of FAA controller personnel. At Shemya, the installation of electronic equipment need not be approved by appropriate authority within the FAA.

The Flight

It had originated at Paine Field, Everett, Washington on 20 July and proceeded to Travis Air Force Base to load military cargo. It then flew non-stop to Anchorage where it received weather and Notam information for the trip to Shemya, however, this did not include the approach or field lighting deficiencies. An instrument flight plan to Shemya was filed. Departure from Anchorage was at 1940 hours and the flight to Shemya was routine and in accordance with the flight plan. The estimated time en route was 6 hours 40 minutes.

At 0145 hours the flight contacted Shemya GCA, and radar contact was made with the aircraft about 18 miles north-northeast of Shemya at 5 500 ft.

The radio transmissions of neither the flight nor GCA were recorded, which was in direct violation of instructions issued by Northwest Airlines for operation of the GCA. The description of how the flight was controlled through the instrument approach is based to a large degree on the controller's testimony. He advised the flight, while it was still in the surveillance pattern, to expect possible "wind burble" on final approach between one mile

and 1/4 mile from touchdown point. He stated that he gave the flight the following Shemya weather information "indefinite ceiling 200 ft; sky obscured; visibility one mile in fog; new altimeter 29.86".

The controller said the flight intercepted the glide path properly and maintained a good course during the entire approach. When the flight was two miles from touchdown, it dropped about 10 to 15 ft below the glide path, and he advised it several times to "ease the aircraft up". No apparent correction was made. About one mile from touchdown the flight went an estimated 30 to 40 ft below the glidepath, and he again advised the flight several times to "bring the aircraft up", yet no apparent correction was made. He advised the flight it was passing GCA minima at 1/2 mile out and was still below the glide path. He said the flight maintained the 30- to 40- foot below glide path condition until it was over the approach lights, which begin 1 460 ft before the threshold of the runway. At no time did he consider the flight to be in danger, and that the 30- to 40- foot below glide path condition was still well above the minimum safe altitude for the approach. He said that when the flight was over the approach lights, it started to descend rapidly and he assumed the captain had taken over visually for his landing, intending to "grease it on" at the end of the runway. He therefore did not advise the pilot of his position relative to the glide path at that point. The controller said that he continued to advise the flight that it was below glide path (though not stating how far below, or that the safety limits were being exceeded). He stated that he last saw the aircraft on radar at the end of the runway, and also that he knew it had crashed because he did not see the aircraft target move down the runway as he usually is able to do. He also stated that the flight's transmissions indicated to him that the pilot understood all instructions and was familiar with the GCA approach to Shemya's runway 10.

The aircraft struck the embankment about 200 ft short of the threshold in a

nearly level attitude, the nosewheel touching first about 18 ft below the crest, very nearly aligned with the centreline of the runway. The aircraft slid up the embankment during impact and when it reached the crest, broke in two (laterally) at the leading edge of the wings. Fire followed impact, and the majority of the wreckage was consumed.

Analysis

Examination of the power plants revealed that all four engines were capable of producing adequate power. Indications were that the fuel flow to all engines was normal. Control surfaces and control mechanisms seem to have been operating normally. There was no evidence that any of the aircraft systems malfunctioned. Both altimeters were at the proper setting. Examination of the structures of the aircraft showed that they were integrally sound before impact. The landing gear was fully extended and locked and the wing flaps were extended beyond 30°. The landing lights were extended and believed to have been on inasmuch as they were observed by an eyewitness. Since they were on, it is believed that the aircraft was below the clouds during some portion of the approach. Use of these lights in the clouds would have caused adverse reflection to have been experienced by the crew. Consequently, this would have hampered their ability to make visual contact with the runway.

The lack of any transmissions on frequencies 134.1 Mc/s and 121.5 Mc/s by the flight supports the view that no emergency existed.

The forward visibility of the crew when it was over the approach lights could have been as low as 1/2 statute mile if the aircraft had been clear of clouds in that area. Conditions of temperature and moisture in the approach zone were not conducive to structural icing, and it is, therefore, not considered to have been a problem. Also, according to the sun and moon data, the accident occurred during the hours of complete darkness.

Since the captain did not execute a missed-approach procedure, did not question the condition of the weather, and since he was not advised by GCA to abandon his approach upon reaching a critically low altitude, it is assumed that he had visual contact with the runway and was contemplating a successful landing.

The controller stated in his testimony that he saw the aircraft target over the end of the runway. However, this target return must have been from part of the wreckage which continued up the runway from the point of impact.

The six pairs of red approach lights, two of the green threshold lights, and the first four pairs of runway lights beyond the two operating threshold lights were not lit. The single strobe light was lit; however, its beam was directed 4-1/2° above the glide path angle of 3°. As an aircraft goes below the beam of the strobe light the effectiveness of the light is greatly reduced. For example, at a point 50 ft below its directed beam, the effective strength of the beam is reduced by as much as 75%.

The captain could not have known that the approach lights and some of the threshold and runway lights were inoperative since this information had not been given to him. It is also believed that he would not have flown below his minimum altitude had he not had some portion of the runway lights in sight. The Board concludes, however, that the existing lighting situation was a factor in causing the captain to improperly orient himself with the runway. The Board further concludes that the captain knew he was below the glide path throughout the approach but did not believe it to be critical.

It should be noted that although the approach procedure was flight checked and approved by the Flight Standards Service of the Federal Aviation Agency, apparently no consideration was given to the fact that the AN/FPN-33 is not deemed suitable by the Aviation Research and Development Service, the Aviation Facilities Service, or the Air Traffic Service of FAA for use

as an FAA-operated air traffic control facility. A finite value in feet cannot be estimated accurately on a radar scope with the type of presentation provided for the AN/FPN-33. For this reason, the military services have instructed their controllers to refrain from the practice of providing foot values of displacement from centrelines of azimuth or elevation when utilizing precision radar equipment with this type of display.

Furthermore, although the controller was directly involved in the control of civil air traffic under instrument flight rules, FAA did not enforce any requirements for certification and area rating, current medical certificate, Class II, or

current proficiency in radar operation or other aspects of air traffic control.

Probable Cause

The probable cause of this accident was the absence of approach and runway lights, and the failure of the GCA controller to give more positive guidance to the pilot during the last stages of his approach.

Recommendation

The Board has recommended to the Administrator that he take action to ensure that personnel and equipment used in GCA approaches meet pertinent standards for such operations.
