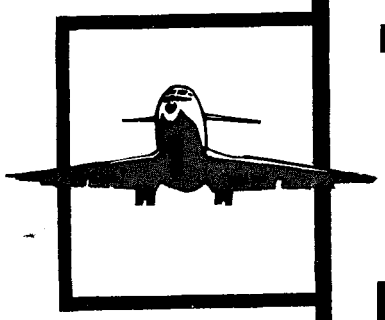

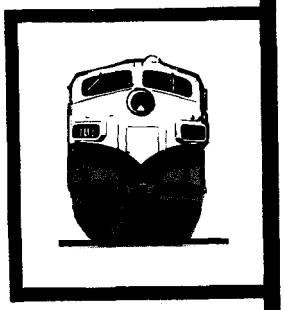

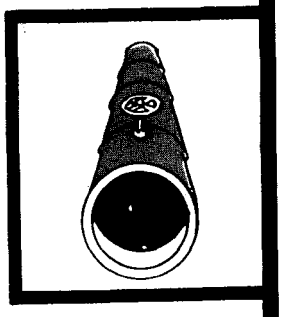

PB87-910412

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

NORTH STAR AVIATION, INC.
PA-32 RT-300, N39614
AND ALAMEDA AERO CLUB
CESSNA 172, N75584
OAKLAND, CALIFORNIA
MARCH 31, 1987

NTSB / AAR-87/09

UNITED STATES GOVERNMENT

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15. Supplementary Notes

16. Abstract On March 31, 1987, about 0958 local time, a Cessna 172 that had departed from Metropolitan Oakland International Airport collided with a Piper PA 32 cargo flight that was cleared to land at the airport. Visual meteorological conditions prevailed. The collision occurred at an approximate altitude of 1,000 feet msl, about 1 mile north of the departure end of runway 33. The airplanes were destroyed, all three persons on the airplanes were killed, and one person on the ground was injured as a result of the collision.

The National Transportation Safety Board determines that the probable cause of this accident was the failure of each pilot-incommand to see and avoid the other aircraft and the failure of the local controller to perceive the traffic conflict and issue traffic advisories. Contributing to the accident was the reduction in airspace separation between arriving and departing aircraft at Oakland's north field runways caused by the failure of the FAA to exercise its authority over airspace management and the Oakland airport authority's establishment of noise abatement departure patterns without FAA approval. Also contributing to the accident was the decision to remove the BRITE radar from service while the tower was in operation.

17. Key Words BRITE, radial keratotomy, noise abatement, air traffic control, ARSA.

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CONTENTS

EXECUTIVE SUMMARY

On March 31, 1987, about 0958 local time, a Cessna 172 that had departed from Metropolitan Oakland International Airport collided with a Piper PA 32 cargo flight that was cleared to land at the airport. Visual meteorological conditions prevailed. The collision occurred at an approximate altitude of 1,000 feet msl, about 1 mile north of the departure end of runway 33. The airplanes were destroyed, all three persons on the airplanes were killed, and one person on the ground was injured as a result of the collision.

The issues highlighted in this report primarily concern actions taken by the airport manager to reduce aircraft-related noise around the airport, which resulted in reduced separation between arriving and departing aircraft at Oakland. In addition, at the time of the accident, the radar in the airport tower had been taken out of service for routine, scheduled maintenance. Another safety issue is the ophthalmic surgical procedure, radial keratotomy, which may have affected the ability of the pilot of the Piper to see and avoid the other aircraft.

The National Transportation Safety Board determines that the probable cause of this accident was the failure of each pilot-in-command to see and avoid the other aircraft and the failure of the local controller to perceive the traffic conflict and issue traffic advisories. Contributing to the accident was the reduction in airspace separation between arriving and departing aircraft at Oakland's north field runways caused by the failure of the FAA to exercise its authority over airspace management and the Oakland airport authority% establishment of noise abatement departure patterns without FAA approval. Also contributing to the accident was the decision to remove the BRITE radar from service while the tower was in operation.

As a result of its investigation, the Safety Board issued recommendations to the Federal Aviation Administration regarding removal of critical pieces of equipment from service at air traffic control facilities, and to the National Association of State Aviation Officials, the Airport Operators Council International, and the American Association of Airport Executives regarding the FAA's airspace management authority.

NATIONALTRANSPORTATIONSAPETYBOARD
WASHINGTON, D.C. 20594

AVIATIONACCIDENTREPORT

Adopted: October 27, 1987

NORTHSTAR AVIATION, INC., PA-32RT-300, N39614
AND
ALAMEDA AERO CLUB, CESSNA 172, N75584
OAKLAND, CALIFORNIA
MARCH 31, 1987

1. FACTUAL INFORMATION

1.1 History of the Flight

On March 31, 1987, N75584, a Cessna 172 with a flight instructor and a student pilot onboard, was en route from Metropolitan Oakland International Airport (OAK) near Oakland, California, to the Livermore, California, practice area. At 0944:18 Pacific standard time, the airplane requested clearance to taxi to OAK's runway 33. At 0955:32, the Cessna was cleared for takeoff from runway 33 with a "right turn out" approved.

At 0954:54, Northstar 1950, N39614, a Piper PA-32RT-300, reported that it was 9 miles north of the airport with the current Automatic Terminal Information Service (ATIS) information. Oakland ATIS information Bravo, which was initially broadcast at 0901:29 and continued until 1019:11, stated the following:

> Oakland International Airport Information Bravo 1700Z weather. 20 thousand thin broken, visibility 15. Temperature 61, dewpoint 42, wind 220 at 4, altimeter 3002. Visual approach runway two niner, ILS and visual approach runway 27 right in use, make right traffic runway 27 right. Runway 29 ILS out of service from 1630 to 2300Z. Airman's advisory, flow control procedures are in effect for aircraft landing Los Angeles International. Contact clearance delivery for engine start time. ARSA testing in progress. Outbound aircraft include type and destination, inbound aircraft include aircraft type with your request at least one five miles from the airport. Advise you have information Bravo.

The airplane, with one pilot on board, was on a ferry flight from Marysville, California, to OAK to receive cargo. The flight had originated in Sacramento, California, about 0400 as a ferry flight to OAK, to load cargo. It departed OAK around 0705 en route to Chico, California, and to Marysville, to offload cargo at each location. Both the Cessna and the Piper operated under 14 Code of Federal Regulations (CFR) 91, and visual meteorological conditions prevailed.

At 0955:15 the OAK north tower controller told the Piper to plan on a right entry runway to 27R. At 0957:33 the Piper reported that it was "over the green tank, turning downwind." The "green tank" referred to a large natural gas storage tank that was used as a visual reporting point for OAK north field operations. (See figures 1 and 2.) At 0957:36 the OAK tower controller responded, "Northstar 1950, Oakland tower, not in sight. Cleared to land runway 27 right, wind 190° at five." Neither the Piper nor the Cessna was given traffic advisories in their communications with the OAK tower controller. No further transmissions were received from either flight. The two airplanes collided about 1,000 feet msl, about 1 mile north of the departure end of runway 33.

Witnesses were generally consistent in describing the movements of the Cessna and the Piper. The two planes reportedly approached each other relatively head on and struck left wing to left wing. They said that the wing of one airplane appeared to break off. The planes then spun, out of control, and fell to the ground.

The Cessna fell in a storage facility of the Pacific Gas and Electric Company (PG & E). It caught on fire on impact with the ground and continued to burn. The Piper fell into a shallow portion of the San Leandro Bay, adjacent to the airport.

Both airplanes were destroyed and the three occupants on both aircraft were killed. A security guard at the PG & E facility sustained serious injuries from the falling debris.

The accident occurred about 0958, during daylight at 37° 45' 30"N latitude and 122° 13' 00"W longitude.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Other	Totals
Fatal	3 *	0	0	3
Serious	0	0	1	1
Minor	0	0	0	0
None	0	0	0	0
Total	3 *	0	1	4

* Includes the pilots of both airplanes.

1.3 Damage to Aircraft

The Cessna was destroyed by collision forces, ground impact, and postcrash fire. The Piper was destroyed by collision forces and water impact. The value of the Piper was estimated at $50,000 and the value of the Cessna was estimated at $25,000.

1.4 Other Damage

A warehouse on the PG & E facility was damaged by falling portions of the Cessna. Some of the Cessna wreckage fell through a roof overhanging the warehouse. A truck parked under the warehouse roof was destroyed by the impact and postimpact fire. (See figures 3 and 4.)

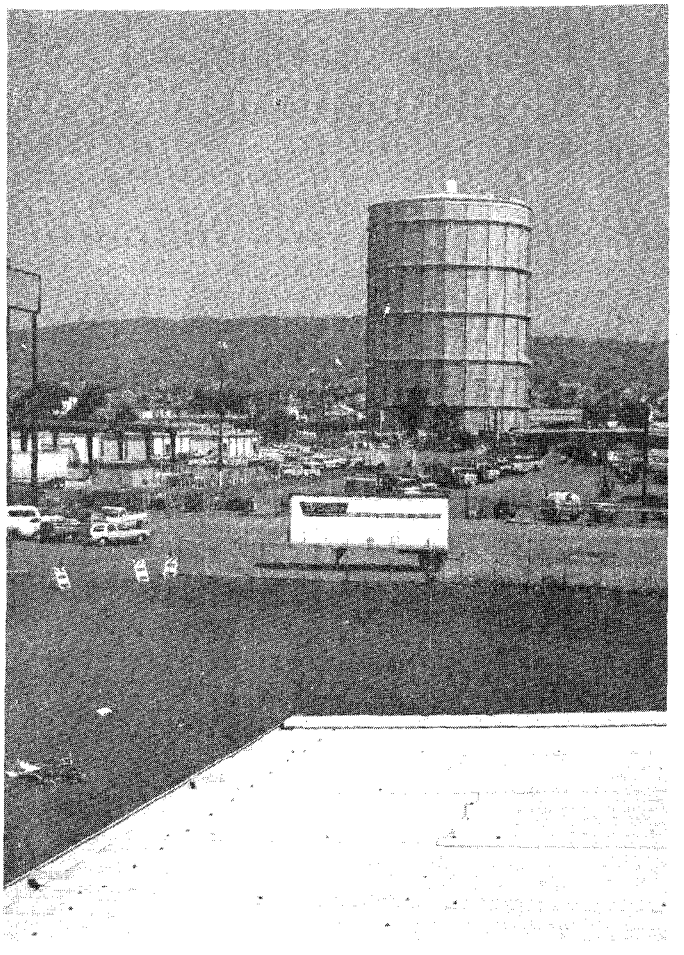


Figure 1. View of green tank from south of freeway.

1.5 Personnel Information

1.5.1 Cessna N75584

The pilot-in-command of the Cessna had received most of her piloting experience from the Alameda Aero Club, which was based at **OAK.** (See appendix B.) According to several of the officers of the club, she had a long-term interest in aviation. They considered her to be one of the club's best flight instructors, a very goal-oriented individual who was pursuing a career as an airline pilot. Her personal life was reported as stable and satisfactory. She was planning to marry in August. She was a full-time student in aviation management at a nearby college, while earning income and gaining flight experience through her employment with the Alameda Aero **Club.**

Her total flight hours could not be determined because her pilot log was destroyed in the accident. **However, information on her most recent Federal Aviation** Administration (FAA) medical certificate, completed on September 2, 1986, indicated that she had accrued 1,250 flight hours at that time.

Figure 2. Green tank as seen on climbout from runway 33 of OAK.

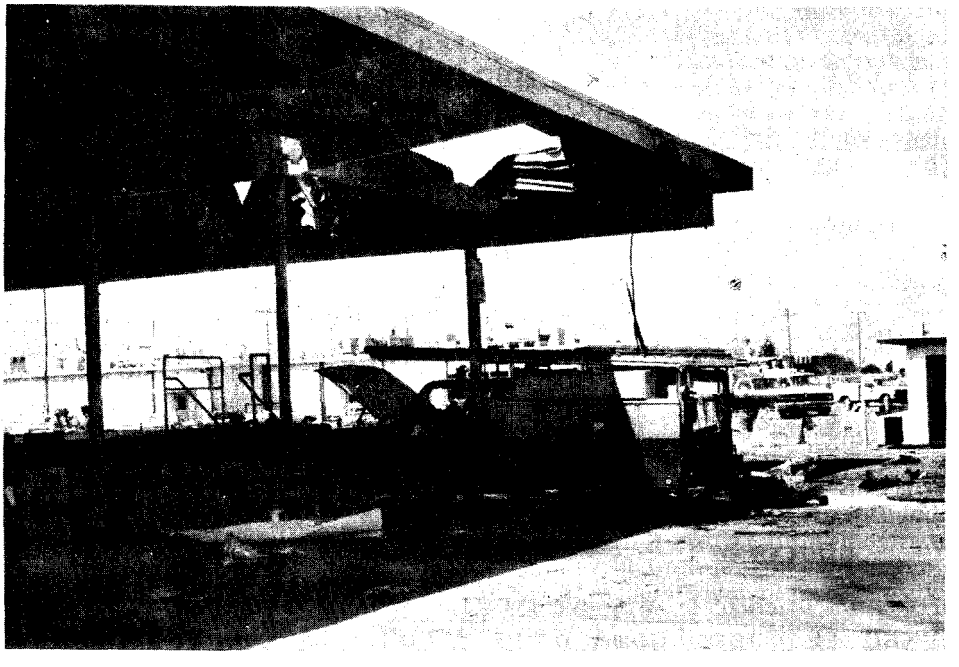


Figure 3.--View of roof and truck damage, facing west.

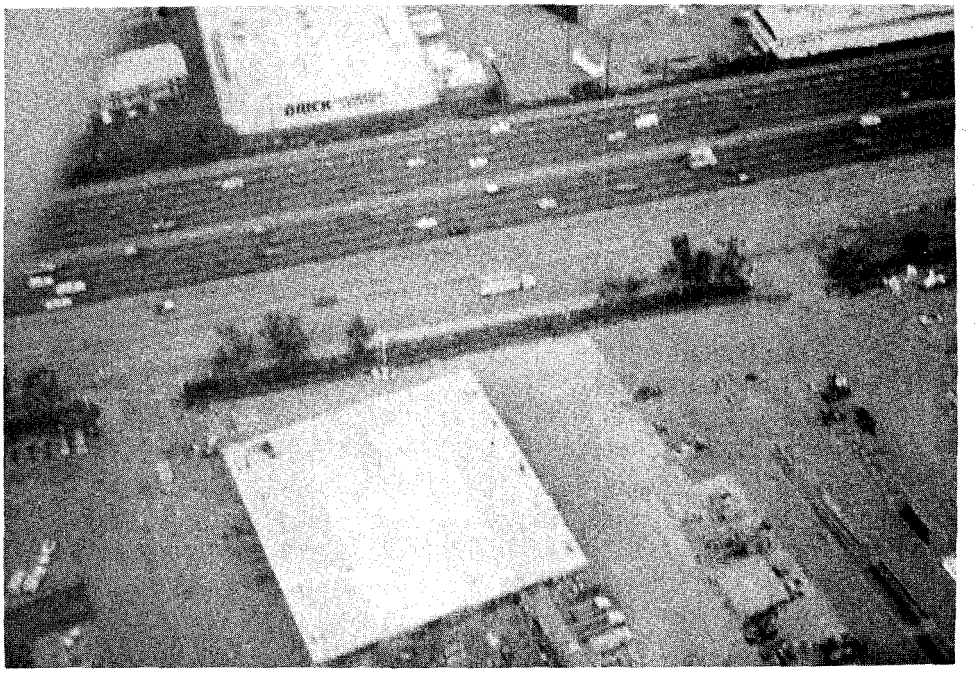


Figure 4.--View of roof damage, facing north, from about 600 feet above ground level.

The passenger, a first year student in a local college, was a student pilot taking his second instructional flight. He had no FAA certificates.

1.5.2 Piper N39614

The pilot of the Piper began his employment at North Star on May 15, 1986. He received his initial flight training at Embry-Riddle Aeronautical University, Daytona Beach, Florida, where he had studied Aeronautical Science. From January 1984 to July 1984 he was a flight instructor in Redding, California. From July 1984 through January 1986, he was a first officer on a Cessna Citation for a corporate aviation department. On October 17, 1986, he unsuccessfully attempted to qualify for 14 CFR 135 authority to operate North Star's Cessna 402. On March 3, 1987, he successfully qualified for an FAA Airline Transport Rating certificate. He was qualified to fly the Cessna 210 and the Piper PA 32 at North Star. At the time of the accident, he had accrued an estimated 1,825 flight hours, of which about 115 hours were in the Piper PA 32.

At the time of the accident, he was married and the father of two children. The investigation revealed no personal or financial difficulties.

The pilot had been off duty on the weekend before the accident. On Monday, March 30, he slept for 4 hours in the afternoon, had dinner and, following dinner, slept an additional 4 hours. He left his home at 0145 on Tuesday, March 31, and drove to Sacramento, a drive of over an hour, for the estimated 0400 departure.

1.6 Aircraft Information

1.6.1 Cessna N75584

The Cessna 172N, N75584, serial No.17267827, was manufactured by Cessna Aircraft Company in 1976. (See appendix C.) It was owned by an individual and leased back to the Alameda Aero Club. The airplane was certificated and maintained in accordance with applicable Federal aviation regulations.

The weight and balance of the airplane could not be determined precisely because airplane records were destroyed in the accident. However, based on the combined weight of the two occupants, 310 pounds (130 and 180 pounds), the airplane would have been within acceptable weight and balance limitations, even with a full fuel load.

The airplane was painted in the specialized "Hawk" scheme offered during the mid to late 1970s. It had a white undercoat, with other colors then added to the fuselage and wings to form the image of a hawk. The upper portion of the engine cowl was black with a yellow hawk's head on either side. This transitioned to a wide brown and bronze stripe along the fuselage, with yellow talons painted on the main landing gear wheel fairings. The leading edges of the wings were bronze, with brown continuing aft to about the third chord point on the bottom skin. The wing bottoms were brown, with bronze from about the mid-span of the aileron to the tip. The leading edge of the vertical stabilizer was black, continuing aft to about the half-chord point. The word "HAWK" was painted in white on each side of the stabilizer.

1.6.2 Piper N39614

The Piper PA 32 Lance, N39614, serial No. 32 R7885232, was manufactured by the Piper Aircraft Company in 1978. It was owned and operated by North Star Aviation, Inc., of Redding, California. The airplane was certificated and maintained in accordance with applicable Federal aviation regulations.

The estimated takeoff weight of the airplane was 2,584 pounds. Its weight and center of gravity were found to be within acceptable limits for the flight.

The airplane was painted white, with a 3-inch-wide orange and blue stripe beneath the cabin windows, continuing up the vertical stabilizer. A thin yellow stripe began aft of the cabin windows, above the orange strip, and continued to the trailing edge of the rudder. The same stripe pattern appeared on the outer bay of the upper and lower surfaces of the wings, with 6-inch wide, blue inboard and yellow outboard stripes, with an orange stripe in between the blue and yellow ones.

1.7 Meteorological Information

The surface weather observations for Metropolitan Oakland International Airport on the day of the accident were, in part, as follows:

0845 sky-20,000 broken; visibility--15; temperature-- 61°F; dewpoint--42°F; wind--240° at 4 knots; altimeter- 30.02 inHg.

0945 sky--10,000 scattered, estimated 20,000 broken; visibility 15; temperature--62°F; dewpoint--50°F; wind--220° at 5 knots; altimeter--30.01 inHg.

1005 sky--estimated 20,000 broken; visibility-15; temperature--62°F; dewpoint--46°F; wind--220° at 6 knots; altimeter 30.02 inHg.

At the time of the accident, the elevation of the sun was 44.7° and its azimuth was 129.09

1.8. Aids to Navigation

There were no reported difficulties with navigational aids.

1.9 Communications

There were no reported difficulties with communications.

1.10 Aerodrome Information

1.10.1 Oakland Airport

Metropolitan Oakland International Airport, elevation 6 feet msl, is located 4 miles south of the city of Oakland, California. The airport has four hard surfaced, asphalt covered runways; 11-29, 9R-27L, 9L-27R and 1533. (See appendix D.) Runway 11-29, which is 10,000 feet by 150 feet, comprises the south section of the airport and is used primarily by air carriers. It is served by its own air traffic control tower, the south tower, which operates daily, 24 hours a day.

Runway 9R-27L is 6,212 feet by 150 feet, runway 9L-27R is 5,453 feet by 150 feet, and runway 1533 is 3,366 feet by 75 feet. These runways, which comprise the north section of the airport and are used primarily by general aviation aircraft, are served by a separate air traffic control tower, the north tower. It operates daily, from 0645 to 2200, at which time the south tower assumes the responsibility for air traffic control of those runways.

1.10.2 Oakland Airport-Air Traffic Control

One supervisor, the air traffic manager, was responsible for the performance of controllers at both the north and south towers at OAK. (See appendix H for ATC transcript.) The north and south air traffic control towers were authorized, in addition to an air traffic manager, 5 area supervisors, 1 training specialist, and 25 controllers. On the day of the accident, although all authorized positions were filled, two of the authorized five area supervisors were receiving on-the-job supervisory training. As a result, one additional person was assigned to perform the duties of the area supervisor until the two supervisors in training were qualified. Of the 25 controllers, 24 were qualified at the full performance level, which, at OAK, required certification at all positions in both the north and south towers.

Ordinarily, there were two shifts of controllers scheduled to be on duty at the north tower. The times of the shifts were 0645 to 1445 and 1400 to 2200. The staffing was the same in both shifts: one local controller; one ground controller; one controller serving as coordinator; and one supervisor. Although there was a provision for a second local controller, this position was infrequently filled.

On the day of the accident, three controllers were assigned to and operating the local, ground, and coordinator positions. However, there was only one shift for the supervisor, from 1000 to 1800. At all other times when the tower was in operation, the coordinator had the additional responsibilities of supervisor.

At the time of the accident, the traffic density was considered 'light to moderate--normal," by the local controller. In the approximate 3-minute period preceding the accident, the local controller, in addition to controlling the two accident aircraft, also controlled a Cessna 150 that departed from runway 27R, a Cessna 172 that landed on 27R, a Piper PA 28 that was landing on runway 27R behind behind the Cessna 172, a Cessna 150 on a short final approach to runway 27R, a helicopter inbound to OAK, and a Cessna 152 in the pattern for runway 27R.

1.11 Flight Recorders

Neither airplane was equipped with a cockpit voice recorder or a flight data recorder, nor were such recorders required.

1.12 Wreckage and Impact Information

The main wreckage of both airplanes was found within a 2,500-foot diameter circle centered about 7,900 feet north of the departure end of runway 33. (See figure 5.) The center of the circle was aligned on a magnetic heading of 357° from the departure end of runway 33.

1.12.1 Cessna N75584

An approximate 6-foot section of the Cessna's left wing and several aileron fragments from the wing were found in a parking lot in the DiSalvo Trucking Company, about 8,300 feet from the departure end of runway 33, on a magnetic heading of 353°. The tip of the left wing, strobe light power supply, and aileron were detached. Wing tip and aileron fragments were found near the wing section; however, the strobe light power supply could not be located. A sharply defined slash on the wing section angled inboard and forward at a 45° angle to the airplane's lateral axis. Prominent paint transfer marks were found on the wing's leading edge along with a line of white paint transfer marks, containing about a dozen parallel scratches, on the bottom skin. The paint transfer line was at an approximate 35° angle, outboard to inboard, to the wing chord line. The scratches were spaced apart about 0.25 inches.

The remainder of the Cessna's wreckage was found inverted, about 1,185 feet north of the left wing section, in the PG & E storage facility. Much of that wreckage, including the instrument panel, the cockpit door, all seats, the anti-collision lights, and most of the fuselage, was burned by the postimpact fire. The nose was oriented on a northerly heading. There were imprints from the wings on the roof of the PG & E facility. Sections of the cabin roof and the left elevator balance weight were lodged in the southeast edge of the hole on the roof.

The top 3 feet of the vertical stabilizer separated from the main wreckage and were found in an area immediately under the section of the roof damaged by the falling debris. A rounded indentation on the left side of leading edge of the vertical stabilizer extended upward 8 inches from the fracture line. There was a white paint transfer in the indentation, with scratches upward and aft from the longitudinal axis, at an approximate 25° angle. The front spar of the stabilizer was displaced top to right, about 15 inches.

The engine separated from the firewall and was found inverted, resting against a fence along the perimeter of the PG & E facility. The crankshaft and connecting rods were intact. The engine was separated from its accessories and from the propeller. The propeller was located in the main wreckage area. The mounting bolts were fractured through the threaded area and bent against the hub.

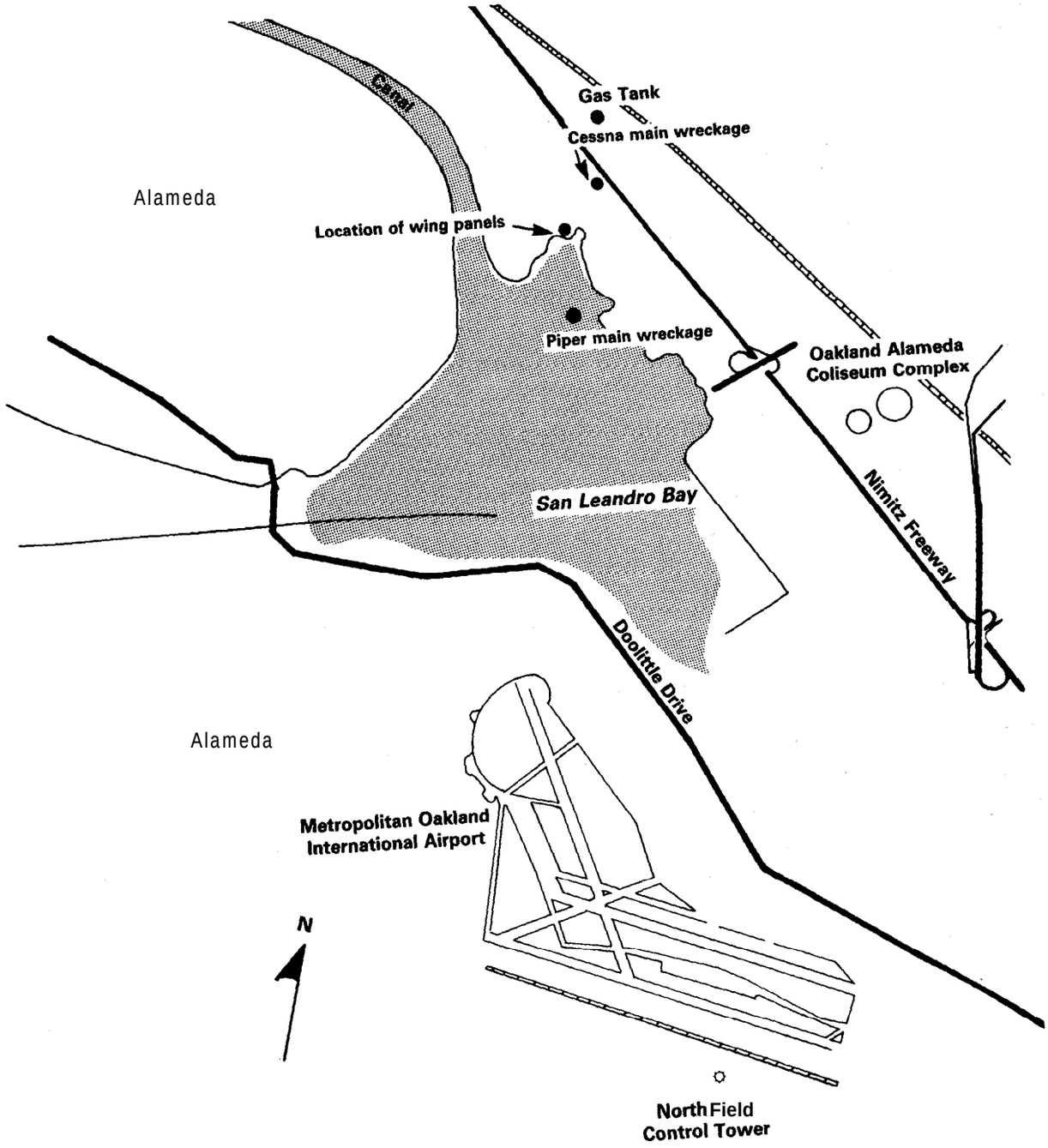


Figure 5.--Wreckage distribution.

1.12.2 Piper N-39614

Most of the wreckage of the Piper, with the exception of the propeller, engine, and most of the instrument panel, was recovered from a shallow portion of San Leandro Bay. An approximate 80-inch section of its left wing separated from the fuselage, along the inboard seam of the outboard fuel tank. The wing section came to rest on the roof of the DiSalvo Trucking Company garage adjacent to the PG & E facility. The main wreckage of the Piper came to rest about 1,530 feet south of the Piper wing section, on a heading of 150°. There was a brown paint transfer on the bottom skin of the wing section, at the leading edge, near the separation point. The transfer continued aft and outboard, at a 6° angle from the wing section's chord line.

The remainder of the left wing was detached from the fuselage at the wing root, most likely as a result of water impact. It was recovered from the San Leandro Bay, near the main wreckage. There was a 51-inch-long heavy brown paint transfer with small black streaks across the leading edge of the left wing. The paint transfer, which began 38 inches outboard of the wing root, continued to the separation point, on an approximate 20° angle inboard to outboard, front to rear.

The entire leading edge of the left wing was crushed aft non-uniformly. A brown paint transfer on the top surface of the wing, in a spanwise direction, extended from forward of the flap/aileron junction to about 2 feet outboard of the aileron attachment. The flap and aileron wing attachments were attached to the wing but the fittings were damaged. The left navigation light bulb was found intact. The filament was later found to be unstretched.

The landing gear was retracted. Both main gears were found in the "up" position, retained by wing structure deformation. The nose gear was not recovered.

The fuselage and empennage were substantially damaged but with no evidence of the inflight collision. The left switch panel was recovered. The master switch, fuel pump, anti-collision lights, and landing light were found in the "on" position, and the pitot heat switch was found in the "off" position.

1.13 Medical and Pathological Information

The three persons killed in the accident died of extensive trauma caused by the inflight and ground collision forces. Toxicological analyses of blood samples of the pilots and the student pilot were negative for drugs-or alcohol. After the accident the OAK north tower local controller was asked to submit a urine specimen for toxicological analysis. He complied with the request about 1400. The results of the analysis were negative for drugs and alcohol.

A guard at the entrance gate to the PG & E facility was injured by the explosions on the ground. He sustained a mild concussion, ruptured eardrum, and bruises and remained in a local hospital for 2 days.

1.13.1 Piper N39614

On November 6, 1985, the pilot of the Piper underwent radial keratotomy surgery on his left eye, to correct a myopic condition. Eight incisions to the lens of the eye were performed. (See section 1.13.2.) On December 18, 1985, the same procedure was performed on his right eye, also with eight incisions. Prior to the surgery, his vision had been measured as 20/200 in each eye, corrected to 20/20. Following the surgery, his vision was measured as 20/25 in the right eye and 20/20 in the left eye, both uncorrected. The pilot did not report problems with glare or variable vision after the surgery.

On January 7, 1986, in his application for a first class medical certificate, the pilot informed the FAA of the surgery. In the medical examination performed on that date he successfully demonstrated visual acuity in both eyes without corrective lenses. On April 8, 1986, he was granted an FAA first class medical certificate with the proviso that "Because of your history of radial keratotomy, operation of aircraft is prohibited at any time new symptoms or adverse changes occur."

The pilot's most recent medical certificate was granted on January 12, 1987. His vision was evaluated and, according to the examining physician, he had "normal uncorrected stable vision (that had been) observed for over 1 year." He was granted a first class medical certificate with no limitations. According to the examining physician, following the surgery the pilot did not report experiencing problems with glare. In fact, the pilot told the physician that he experienced less of a problem with glare following the surgery than before when he had been wearing contact lenses.

1.13.2 Radial Keratotomy

Radial keratotomy is a surgical procedure designed to improve myopic vision or nearsightedness. It involves making several radial incisions, from the center of the cornea to the periphery, to reshape the cornea and lens. The procedure began to be performed in this country around 1978.

Medical opinion on the risks and benefits of this procedure varies. Potential adverse effects include glare, and "drifting" or fluctuating vision as a function of daily changes in intraocular pressure. Patients experiencing drifting can have changes in visual acuity from 20/20 at one time of day to 20/30 and 20/40 at another. Because of its unpredictability, drifting cannot be corrected. In addition, it is estimated that about 10 percent of radial keratotomy patients will return to their original myopic condition in spite of the procedure.

In March 1986, at the request of the FAA, the American Medical Association (AMA) completed a review of 14 CFR 67 regulations concerning medical certification of airmen. 1/ 2/ The purpose of the review was to provide the FAA with a comprehensive examination of medical standards pertaining to airmen. Because the previous review took place in 1959, and significant advances in medical diagnosis and treatment have occurred since then, the review would allow the FAA to determine, with information from the most current medical literature, the medical fitness of applicants for an airman certificate. The review was carried out by 71 physicians who were clinical specialists in aviation medicine or had a special interest in aviation. All were considered to have "strong credentials" in a clinical medical specialty. Four physicians formed the visual system committee, including a retired medical school dean and an ophthamology department chairman at an Air Force hospital.

The final report of the AMA's review was divided into five sections, which included recommended changes to medical standards, recommended changes to the examination form used by Airman Medical Examiners, a rationale for changes, and recommendations for future research.

1/ American Medical Association, Review of Part 67 of the Federal Air Regulations and the Medical Certification of Civilian Airman, Vol. I and II, FAA Contract # DTFA01-83-The C-20066, March 1986.

2/ Engelberg, A.L., Gibbons, H.L., Doege, T.C. A review of the medical standards for civilian air men: Synopsis of a two year study. Journal of the American Medical Association, 1986, 225, 1589-1599.

Although the AMA did not recommend changes to the medical standards based on a history of radial keratotomy, in its rationale for changes, the AMA concluded that:

> Surgical results with radial keratotomy are variable. Stability of postoperative refraction is also variable especially in the first few months, when night glare and fluctuating vision are significant complaints.
>
> Ninety one percent of individuals who have undergone radial keratotomy would meet the visual acuity standards for a Class I (medical) certificate. However, approximately one-fourth of these persons have some mild to moderate difficulty with glare, visual fluctuation, and night driving. These are subjective phenomena that cannot be detected or quantified with present-day examination techniques. For this reason, persons who have undergone' radial keratotomy should be excluded from obtaining Class I or Class II (FAA medical) certificates. Those individuals who apply for Class III certificates should not be certified until at least one year after radial keratotomy. Visual acuity and refraction should be stable when tested repeatedly over an eight-hour time period. The applicant must be queried about difficulties with glare and night driving. If these symptoms are present, the applicant should be denied certification.

According to the manager of the Occupational Health Division at the FAA's Office of Aviation Medicine, air traffic controllers who have undergone this procedure are denied medical certification. This policy has been in effect since August 1983, when the visual acuity standards for air traffic controllers were updated. However, according to the office of the Federal Air Surgeon, waivers from this policy were granted to one or two controllers on an individual basis. This policy does not apply to pilots; they are required to demonstrate to their optometrists or opthamologists only that their vision is "stable." The FAA does not provide a definition of stability for the vision of pilots, but it does for controllers. Consequently, standards of visual stability regarding pilots are left to the discretion of the vision specialist performing the examination. Physicians in the U.S. Army and U.S. Air Force informed the Safety Board that pilots in the U.S. military services are not permitted to undergo the surgery and will be permanently withdrawn from flight status if they are discovered to have undergone radial keratotomy.

FAA data indicate that, as of January 1987, 222 or 0.19 percent of the 115,808 first class airmen medical certificates were granted to pilots who stated that they had undergone radial kerototomy. Among the 27,255 second class airmen medical certificates granted, 246 or 0.9 percent were to pilots who had undergone the procedure. Of the 369,695 third class airmen medical certificates granted, 343 or 0.09 percent were granted to pilots who had undergone the surgery.

1.14 Fire

The major portion of the wreckage of the Piper fell into the San Leandro Bay and, as a result, there was no fire. The wreckage of the Cessna exploded on impact and burned until the fire was extinguished by units of the Oakland Fire Department.

The portion of the Cessna wreckage that struck the PG & E roof also struck a PG & E service truck that was parked underneath. The wreckage exploded on impact and set the truck on fire, destroying it.

1.15 Survival Aspects

The accident was nonsurvivable due to excessive decelerative forces and disruption of the occupiable space in the airplanes.

The Oakland Police Department was notified of the accident at 1001 and immediately dispatched five cruisers to the scene. The Oakland Fire Department was notified at 0958 and they immediately dispatched two pieces of firefighting equipment, which arrived onscene at 1000. The source of the notification was not determined. The controllers on duty at the OAK north tower saw the airplanes spiral to the ground but did not see the collision or recall if a controller notified the emergency services. A second alarm was then sounded and five additional pieces of firefighting equipment were dispatched. At 1006, an ambulance was requested to transport the injured PG & E guard to a nearby hospital. The ambulance arrived at 1015. The coroner arrived onscene at 1030.

1.16 Tests and Research

Two days after the accident, investigators flew in a Cessna 172 from OAK. The airplane completed two departures from runway 33, one following the flightpath that was used prior to the installation of noise abatement signs around OAK (see section 1.17.1) and the other in a flightpath described by noise abatement signs posted around the airport. In the flightpath used before the signs were installed, the airplane reached about 1,000 feet above ground level (agl) and arrived west of the "green tank" OAK visual landmark. (See figure 1.) In the second departure, the airplane arrived directly over the green tank, about 1,000 feet agl.

1.17 Additional Information

1.17.1 Noise Abatement Procedures

OAK is owned and operated by the Port of Oakland. Before the accident, residents of the city of Alameda, located west of the airport, increased their objections to the noise generated by aircraft departing OAK's north runways (9L-27R, 9R-27L, and 15-33). In 1983, the airport began monitoring aircraft noise in and around Alameda. Around the same time, the airport developed a noise abatement plan and published a version of it in a one-page handout, sized as an instrument approach chart, which it distributed to local pilots. (See appendix D.) The handout stated that: "Your compliance with our noise-abatement procedures is extremely important in maintaining goodwill between Oakland Airport and the surrounding communities."

According to the handout, the procedure called for aircraft departing runway 33, the runway used for most north field departures from OAK, to: "make a 45° right turn as soon as possible after takeoff. Overfly center of San Leandro Bay, avoiding northwest shoreline. Fly to left of Green Tank; then establish departure heading." A map on the reverse side displayed the desired flightpath. The flightpath resulting from this procedure for aircraft departing runway 33 was an approximate heading of 015° followed by a turn to the northwest upon reaching land.

According to the OAK airport manager, complaints about aircraft noise from local residents continued to increase, despite the publication and distribution of the noise abatement procedures. Several months before the accident, a group of citizens formed CEASE, Concerned East Alamedans for Safe and Quiet Environment, in an attempt to reduce airport noise further. CEASE members attended OAK noise abatement meetings and expressed citizen concerns about noise. Several weeks before the accident, an

Alameda citizen sued the airport authority for damages from excessive aircraft noise near his house. On January 26, 1987, at a meeting of the Alameda Town Council that was attended by the airport manager and the OAK air traffic manager, over 100 Alameda residents vociferously complained about the adverse effects of noise caused by aircraft departing OAK. At that meeting, the OAK air traffic manager heard the airport operations supervisor direct an assistant to post noise abatement signs around the airport "even if he had to paint them himself."

On February 5, 1987, the airport installed and prominently displayed signs in and around the north field. The signs were posted at 10 locations, including the gate used to drive into the ramp serving the north field, the major taxiway from the ramp to the runways, and on a taxiway, just ahead of the runup area for aircraft departing runway 33. (See figures 6 and 7.) The signs, which were identical, read: "Attention-For noise abatement turn right to 360° until reaching freeway. Fly Quiet." Since the Nimitz Freeway, the freeway referred to in the sign, was located some distance beyond the shoreline, pilots began their turn to the northwest upon reaching the freeway and, as a result, often overflew the green tank, rather than flying to the left or west of it. Neither noise abatement procedure was published in the Airport Facility Directory.

Aircraft inbound to runways 27R and 27L were unaffected by the "new" noise abatement procedures. According to OAK local air traffic controllers, arriving aircraft were expected to fly east of the green tank, that is, between the green tank and the Oakland Coliseum, another prominent visual landmark.

1.17.2 Interaction Between Airport and OAK Tower

The FAA's OAK air traffic manager participated with the airport operations supervisor and others in the quarterly OAK noise abatement meetings. As a result, the air traffic manager was aware that the airport was planning to increase its noise abatement efforts and that signs addressing noise abatement were in the process of being developed. However, the air traffic manager was not told, before the fact, when signs defining the noise abatement procedures were to be posted around the airport, where they were to be posted, or what they were to say.

On February 5, 1987, the OAK air traffic manager received a call from the north tower informing him that the signs had been posted. This was the first time he was notified of the presence of the signs. The air traffic manager did not object to the airport manager about the signs themselves, although he did object to the wording on the signs. His objection was based on his belief that directing VFR pilots to maintain specific headings could diminish their outside scan. After the accident, the airport operations supervisor told investigators that he believed that the signs did not alter existing procedures so much as clarify them by "verbally describing the intended (flight) track."

After being informed of the signs, the air traffic manager distributed an operations bulletin to OAK tower controllers describing the signs. (See appendix E.) After the accident, the air traffic manager told Safety Hoard investigators that he believed that the controllers saw the signs as advisory, although he had heard controllers deny requests for a straight out departure.

Several days after the accident, Safety Hoard investigators reviewed an ATC recording of March 30, 1987, in which the pilot of N9658K, a single engine PA 28, requested a straight out departure on runway 33. The ground controller responded: "Unable due to noise abatement."

Figure 6.--Noise abatement sign on gate at entrance to ramp.

Figure 7.--Noise abatement sign just ahead of runway 33 runup area.

1.17.3 FAA Noise Control Policy

The Federal Aviation Act of 1958 assigned statutory authority for airspace regulation and management to the Federal Aviation Administration, and, since 1966, to the Secretary of Transportation. The Act, in section 103, 49 U.S.C. 1303 (c), assigns to the FAA Administrator responsibility for:

> The control of the use of the navigable airspace of the United States and the regulation of both civil and military operations in such airspace in the interest of the safety and efficiency of both; . . .

On January 13, 1986, the FAA Administrator issued FAA Order 1050.11A, which presented FAA policy regarding airport noise control planning. It stated that the FAA encouraged efforts to control noise around airports. According to the Order:

> FAA shall not endorse airport use restrictions which are considered unsafe, unjustly discriminatory, or incompatible with efficient management of navigable airspace.

Further, the Order required FAA regional offices to:

> Review flight procedures proposed for noise abatement purposes for any significant adverse effect upon safety, air commerce, and efficient management of the navigable airspace.

Following the accident, on June 5, 1987, the FAA Administrator issued a memorandum to FAA Regional Directors that clarified further official FAA policy regarding noise abatement procedures. (See appendix F.) Although no specific accident was mentioned, the memo referred to two recent midair collisions in the vicinity of airports. It stated, in part, that:

> Regarding operational noise abatement procedures at a specific airport, the policy clearly states that the airport proprietor's role is to propose them to the FAA for implementation. All flight procedures, regardless of whether they are IFR or VFR, are subject to FAA review and approval. Inaction on our part could be interpreted by some as FAA approval or endorsement of the procedure.

1.17.4 OAK Airspace

Above OAK, the San Francisco Terminal Control Area (TCA) extended from 2,100 feet msl above runway 11/29 and from 3,000 feet msl above the other runways to 8,000 feet msl, (See appendix G for the TCA chart portraying the airspace following implementation of the ARSA.) The airspace surrounding and overlying OAK's runway 11-29 lay within a Terminal Radar Service Area (TRSA). Aircraft flying within the TRSA were provided with Stage III radar service, including traffic advisories to VFR aircraft as well as separation among VFR aircraft and between VFR and IFR aircraft. At the time of the accident, aircraft in the airspace surrounding and overlying the north field runways, i.e., runways 27/9 right and left and runway 33/15, were provided with radar service in which traffic advisories and limited vectoring were given to pilots "on a workload permitting basis." Consequently, the north tower controller was not required to provide traffic advisories to aircraft departing from and arriving at OAK. However, FAA Air Traffic Control Handbook 7110.65D states in part:

> Where no separation minima applies, such as for VFR aircraft outside an ARSA, TRSA, or TCA, issue traffic advisories to those aircraft on your frequency when in your judgment their proximity warrants it.

Moreover, FAA policy directs controllers to issue traffic advisories if they perceive a conflict between aircraft. After the accident, the tower controller told Safety Board investigators that he did not provide traffic advisories to the two airplanes because he did not consider the Cessna to be potentially conflicting with the Piper since he thought the Piper was farther out than it really was. He believed that the Cessna would follow the noise abatement profile until it was established on the northwesterly heading, and then would initiate the right turn to the Livermore practice area.

About 20 minutes before the accident, the north tower Bright Radar Indicator Tower Equipment (BRITE) 3/ was taken out of service for routine maintenance, and remained out of service until shortly after the accident. One technician performed the maintenance, a calibration check of the visual display. Since the effects of the resultant changes on controller functions were minimal, no changes in procedures or personnel requirements were in effect when the maintenence procedure was performed. The maintenance was not performed at night, when the tower was closed, since, according to tower personnel, this would have required paying overtime wages to the airways facilities technicians who performed the maintenance. Airways facility personnel stated that such routine maintenance was carried out during periods of moderate to low air traffic. According to the OAK air traffic manager, there was a period of heavy traffic using the north runways from about 0600 to 0900, which decreased thereafter to a period of moderate activity.

OAK north tower controllers appeared to differ in the extent of their use of the BRITE. One controller said that he used the BRITE for traffic advisories, for sequencing, and for aircraft identification. Another said that he used the BRITE "a lot," for advisories to inbound and outbound traffic. Another said that the BRITE is used to verify the location of aircraft, since pilots often "don't know where they are."

Before the accident, the FAA had planned to implement an Airport Radar Service Area (ARSA) around OAK, in early April. The ARSA was implemented on April 9, 1987. In an ARSA, air traffic controllers provide to all arriving aircraft sequencing, traffic advisories, and safety alerts as appropriate, as well as traffic advisories and conflict resolution between IFR and VFR aircraft. These services are provided in addition to standard separation among IFR aircraft. In addition, aircraft traversing an ARSA, inbound to an airport in which the tower has BRITE, are in constant radar contact. Handoffs of radar-identified-aircraft from an approach control facility to the tower controller are made either automatically, through the air traffic control computer system, or by voice contact between the approach controller and the tower controller. Similarly, departing aircraft are handed off from the tower controller to the departure controller either automatically or by direct voice contact between the two controllers. Although ATIS information Bravo, which was current at the time of the accident, noted that ARSA testing was in progress, no such testing was carried out during the period that the BRITE was out of service.

1.17.5 Flight Track

Recorded air traffic control radar data from the Oakland Air Route Traffic Control Center indicate that the collision occurred about 1,000 feet agl. Recorded radar information indicated that the Piper and the Cessna achieved a closure rate of about 194

3/ A display of approach control radar information, via closed circuit television, which presents radar data of aircraft to tower controllers.

knots, based on the Piper's calculated true air speed of 136 knots, the Cessna's true air speed of 81 knots, and the collision angle. Neither aircraft took evasion action, according to both witness reports and radar data. (See figure 8.)

The Safety Board applied radar data on the flight tracks of the Cessna and the Piper to known data on the visibility from the pilot seats of the two airplanes to determine the approximate time that each airplane could have been visible to the pilot of the other. (See appendix I.) The results indicate that each airplane was within the viewing area of the pilot of the other airplane for at least 20 to 30 seconds before the collision, assuming there was no gross deviation from the radar-portrayed paths after final radar contact was made with each airplane. The Cessna would have appeared about 1° to the right of the Piper pilot's eye reference point, slightly above the Piper's engine cowl, in the propeller rotation arc. The Piper would similarly have appeared, to the Cessna pilot, just above the engine cowl of the Cessna. However, because the collision occurred several seconds after the final radar contact between the radar and the Piper and the Cessna, the flight tracks of the two aircraft probably differed somewhat, in those seconds, from what is portrayed in figure 8. For example, according to the expected flight path, the Piper should have begun a left turn to enter the traffic pattern just before the collision. Such a scenario would account for the particular impact angles described by the impact damage, slash marks, and paint transfers of the two airplanes.

2. ANALYSIS

2.1 General

The pilots of the Cessna and the Piper were properly certificated and qualified to operate their respective airplanes. Both airplanes were maintained in accordance with applicable Federal aviation regulations. There was no evidence of preexisting damage to either airplane or to their systems, powerplants, or structures. No adverse winds were reported in the area, visibility was good, and visual meteorological conditions prevailed. Consequently, weather was not considered to be a factor in this accident.

The Safety Board believes that because of the daytime, visual meteorological conditions, the pilots of the Cessna and the Piper should have been able to see and avoid each other in time to avoid the accident, and their failure to do so was a primary cause of the accident. However, the Safety Board examined several factors that may have directly or indirectly affected the safe operation of the airplanes. These factors included noise abatement procedures that reduced the separation between arriving and departing airplanes; the absence of BRITE during a period of moderate traffic activity; the failure of the local controller to issue traffic advisories; and the lack of a uniform FAA policy on granting medical certificates to those undergoing radial keratotomy surgery. Consequently, the Safety Board closely examined the effects of the factors directly and indirectly influencing the operation of the airplanes, separately and in combination with each other, to determine the extent to which they may have contributed to the accident.

2.2 The Accident

The evidence from the scratch marks, paint transfer, propeller slash marks and impact angles indicate that the angle of the relative headings of the two airplanes to each other was approximately 45° at impact. Since, according to the radar data, the Cessna was in an approximate due north heading before impact, this indicates that the heading of the Piper would have been about 135°. The relative pitch angle of the two airplanes to each other was about 10°. Because the radar data indicate that the Piper was at the pattern altitude of 1,000 feet at the time of impact and the Cessna was in a climb, therefore, the physical data indicate that the Cessna was in a 10° nose up attitude at that time.

In addition, the evidence indicates that the manner in which the procedure was implemented was contrary to Federal aviation regulations. That is, the OAK airport manager placed signs describing the procedure at several locations around the north field without the required FAA authorization. Such authorization was implicit within the regulation assigning responsibility for airspace management to the FAA. The locations of the signs were such that pilots operating on the north field could hardly fail to notice them. For example, a sign was placed in the center of the gate across the main entrance from outside the airport to the general aviation ramp, and another was placed on the taxiway just ahead of the runup area of runway 33. In addition, the signs did not state that the noise abatement procedure was presented for guidance only, i.e., that it was not mandatory.

The Safety Board recognizes the efforts required by airport managers to maintain harmonious relations between airport users and the surrounding community. However, airport managers are not required to have expertise in airspace use and the safety implications that result from altering airspace-related procedures. Although the OAK airport manager was attempting to cope with what was certainly a great deal of community pressure, the Safety Board concludes that he exceeded his authority and directly and adversely affected air safety by placing the signs describing non-FAA approved noise abatement procedures on the airport property. Therefore, the Safety Board believes that the actions of the airport manager contributed to the accident.

2.4 FAA Actions

2.4.1 Noise Abatement

The Federal Aviation Act assigns responsibility for airspace regulation to the FAA. However, the evidence indicates that although the OAK air traffic manager learned of the signs relatively soon after they were posted, he did not object to the signs and did not initiate the necessary steps to order their removal or modification. Rather, he expressed some dissatisfaction with only one aspect of the procedure, i.e., the extent to which pilots would be required to reduce their outside scan to maintain a precise flightpath. Yet, despite his objection to the signs on this regard, he did not pursue their modification, let alone their removal.

Moreover, there is no evidence that the OAK traffic manager informed the controllers under his supervision that the noise abatement procedures were advisory only and not regulatory. For example, 1 day before the accident, a controller denied, for noise abatement reasons, a pilot's request for a straight-out departure from runway 33. Thus, even controllers under the OAK traffic manager's supervision acted as if the procedures were mandatory, which they were not. Consequently, the Safety Board believes that the OAK air traffic manager failed to exercise his authority over the OAK airspace by initiating the steps necessary to modify or remove the noise abatement signs and that the failure of the FAA to take action against the signs also contributed to the accident.

On June 5, 1987, the FAA Administrator sent a letter to FAA Regional Directors reminding them of FAA jurisdiction over airspace management. The Safety Board believes that FAA policy and procedures were sufficiently explicit that such a reminder should not have been necessary. The OAK air traffic manager should have anticipated how the noise abatement signs would affect the flightpaths of airplanes departing runway 33, and he should have alerted the FAA's Regional Office to take action through its airport certification branch to remove the signs. The Safety Board believes that, while it is pleased with the FAA Administrator's action in this regard, in the

future all FAA personnel with airspace management responsibility must understand the importance of this responsibility and exercise their authority when necessary to prevent actions that adversely change airspace use. The Safety Board believes that the Administrator's letter of June 5 should promote this understanding.

2.4.2 Radar Service

The Safety Board recognizes the need to regularly perform routine maintenance on items **such as the BRITE** equipment. However, on the day of the accident, technicians at OAK performed maintenance **on the BRITE during a period of** moderate traffic activity and **as a result, the BRITE** was out of service at the time of the accident.

The Safety Board questions the wisdom of a policy that allowed control towers to be closed during periods of light traffic and open during periods of heavier traffic, but, when the towers were open, removed critical equipment from service for maintenance that could have been performed when the towers were closed. The Safety Board recognizes that controllers may be able to perform basic duties and responsibilities effectively without using BRITE, and that BRITE is not required tower equipment; however, when such equipment is available and used over a period of time, controllers often depend on the information it provides and as a result, the BRITE should have been considered an integral piece of equipment at that facility. Without the BRITE, the ability of the controllers to locate specific aircraft 'may have deteriorated since they regularly used the equipment for that purpose. Thus, the absence of the BRITE may explain why the OAK tower controller issued landing clearance to the Piper without first visually confirming his position. It may also explain why the controller did not advise the Cessna that traffic was "reported" over the green tank, information that he could have easily provided without the presence of the BRITE.

The Safety Board concludes that the decision to remove the BRITE from service during a period of moderate traffic activity for routine, easily scheduled maintenance that could have been performed when the tower was not in operation was faulty and contributed to the accident. The Safety Board urges the FAA, at air traffic control facilities that are closed at regular intervals, to schedule routine maintenance on critical pieces of equipment only during periods when the facility using that equipment is closed.

2.43 Air Traffic Control

The Safety Board believes that despite the unavailability of the BRITE and his being unaware of the Piper's location, the OAK local controller should have issued traffic advisories to both the Piper and the Cessna. He was aware that **the** Cessna was departing and would be headed in the general direction of the Piper. He also heard the Piper report **its location over the green tank. Since he had cleared the Piper, even though he did not** confirm its location, and he knew the general direction of the Cessna's flightpath, he should have realized that the two airplanes had a potential conflict. Prudence should, therefore, have dictated that he issue traffic advisories to both airplanes since he did not know the location of one of them.

The Safety Board believes **that had the controller issued traffic advisories to** both the Cessna and the Piper, the pilots would have been particularly diligent in watching for conflicting traffic while in the OAK pattern and as a result, probably would have seen and avoided each other. Therefore, the Safety Board concludes that the failure of the controller to issue traffic advisories to the two airplanes was a primary cause of the accident.

2.4A Radial Keratotomy

There is no evidence to indicate the extent, if any, to which the visual acuity of the pilot of the Piper was adversely affected by his having undergone radial keratotomy surgery. Certainly, enough doubts have been raised in the medical literature about the long term reliability of this procedure to warrant an examination of its possible role in this accident. However, the literature is inconclusive about both the likelihood of someone experiencing adverse visual effects from the surgery and the nature of parameters that could increase the chances of experiencing those adverse effects. As a result, the Safety Board is unable to determine the extent to which this surgery may have adversely affected the pilot's visual acuity at the time of the accident, and what action, if any, the FAA should take with regard to the safety implications of this surgical procedure.

3. CONCLUSIONS

3.1 Findings

1. The pilots were properly certificated and qualified for their respective flights.
2. The airplanes were properly maintained for the flights.
3. Visual meteorological conditions prevailed at the time of the accident; weather was not a factor in the accident.
4. Signs posted around the north field advising departing pilots to follow a flightpath for noise abatement reasons reduced separation between departures and arrivals to the OAK north field runways.
5. The FAA's OAK air traffic manager learned of the signs after they had been posted, but did not order their modification or removal.
6. The OAK north tower BRITE radar was taken out of service for routine maintenance before the accident and remained out of service during the time of the accident.
7. The Cessna and the Piper pilots were not given traffic advisories regarding each other's presence.
8. The OAK tower controller cleared the Piper to land without locating the airplane visually.
9. The airplanes collided about 1,000 feet agl, without taking evasive action.
10. The pilot of the Piper had undergone bilateral radial keratotomy over a year before the accident, but the medical literature is inconclusive as to the likelihood of someone experiencing adverse visual effects following this surgery.

3.2 Probable Cause

The National Transportation Safety Board determines that the probable cause of this accident was the failure of each pilot-in-command to see and avoid the other aircraft and the failure of the local controller to perceive the traffic conflict and issue traffic advisories. Contributing to the accident was the reduction in airspace separation between arriving and departing aircraft at Oakland's north field runways caused by the failure of the FAA to exercise its authority over airspace management and the Oakland airport authority% establishment of noise abatement departure patterns without FAA approval. Also contributing to the accident was the decision to remove the BRITE radar from service while the tower was in operation.

4. RECOMMENDATIONS

As a result of its investigation of this accident, the National Transportation Safety Board recommends that the Federal Aviation Administration:

> At air traffic control facilities that are closed at regular intervals, schedule routine maintenance on critical pieces of equipment only during periods when the facility using that equipment is closed. (Class II, Priority Action) (A-87-114)

The Safety Board also recommends that the National Association of State Aviation Officials, the Airport Operators Council International, and the American Association of Airport Executives:

> Emphasize to airport owners and managers that the statutory authority for airspace management belongs to the FAA, and that all airport noise abatement actions must be coordinated with, and have the approval of, the FAA. (Class II, Priority Action) (A-87-115)

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

/s/ JIM BURNETT
Chairman

/s/ PATRICIA A. GOLDMAN
Vice Chairman

/s/ JOSEPH T. NALL
Member

/s/ JAMES L. KOLSTAD
Member

October 27, 1987

5. APPENDIXES

APPENDIX A
INVESTIGATION AND HEARING

1. Investigation

The National Transportation Safety Board was notified of the accident about 1400 eastern standard time on March 31, 1987.

An investigator from its Los Angeles field office was dispatched to the scene that afternoon and an investigative team from its Washington headquarters arrived on the scene that evening. Investigative groups were established for operations, air traffic control, and airworthiness/maintenance records. In addition, specialists in human performance and radar reconstruction participated in the investigation.

Parties to the investigation were the FAA, North Star Aviation, and the Cessna Aircraft Company. The Alameda Aero Club was an observer to the investigation.

2. Public Hearing

There was no public hearing or deposition held in conjunction with this accident.

APPENDIXB

PERSONNELINFORMATION

Cessna N75584

Anastasia Marie Snyder

Ms. Snyder was born on May 7, 1961. She had been a flight instructor for Alameda Aero Club since September 1983. She held commercial pilot certificate No. 553492617 with airplane single and multiengine land ratings; flight instructor certificate No. 553492617CFI, with airplane single and multiengine land, instrument airplane ratings, and mechanic certificate No. 553492617 with airframe and powerplant ratings. Her first class medical certificate, dated September 2, 1986, contained no limitations.

Scott Edward Lindsey

Mr. Lindsey was born on October 30, 1968. He did not hold an FAA certificate.

Piper N39614

James David Bolesky

Mr. Bolesky was born on January 28, 1962. He was employed by North Star Aviation on May 15, 1986. He held airline transport pilot certificate No. 298689094 with airplane multiengine land ratings, and flight instructor certificate No. 298689094CFI with airplane single and multiengine, instrument airplane, and glider ratings. His first class medical certificate, dated January 12, 1987, contained no limitations.

Air Traffic Control Personnel

Dale E. Bush

Mr. Bush was the air traffic controller responsible for Oakland Northfield Tower local control at the time of the accident. He had been employed by the FAA since September 1981. He was assigned to Oakland following completion of his initial training and he attained full proficiency level in January, 1983. His most recent medical examination was within 60 days before the accident. He has had no operational errors.

APPENDIX C

AIRCRAFT INFORMATION

Cessna N75584

The Cessna 172N, N75584, serial No. 17267827, was manufactured on October 5, 1976. On January 21, 1987, when the most recent annual inspection was performed, the airplane had accumulated 3,372 hours. At the time of the accident, the airplane had accumulated 3,424 hours.

The airplane was equipped with an Avco Lycoming O-320-H2AD engine. At the time of the accident the engine had accumulated 2,733 hours, 628 of -which were accumulated since it received a complete overhaul.

Piper N39614

The Piper Lance, a PA-32RT300, N39614, serial No. 32R- 7885232, was manufactured on July 19, 1978. On March 12, 1987, when the most recent 50-hour inspection was performed, the airplane had accumulated 2,712 hours of flight time. At the time of the accident, the airplane had accumulated an estimated 2,725 hours.

The airplane was equipped with an Avco Lycoming IO-540- K1G5D engine. At the time of the accident, the engine had accumulated an estimated 2,533 hours of total time, 721 of which were accumulated since it received a complete overhaul.

OAKLAND NORTH AIRPORT
VFR NOISE ABATEMENT TRAFFIC PATTERNS

The traffic patterns described below and illustrated an the fold-out photo ore designed to minimize aircraft noise disturbance to homes near the airport. These noise-sensitive areas are shaded on the photo, your compliance with our noise-abatement procedures is extremely important in maintaining goodwill between Ooklond Airport and the surrounding communities. Please take a few moments to. fomiliorize yourself with the flight tracks and reference paints, and keep this sheet in your flight case for future reference. Thonks for your help!

RUNWAYS 27R and 271
DO NOT MAKE STRAIGHT-OUT DEPARTURES.

RIGHT CROSSWIND DEPARTURE: make standard right crosswind turn; overfly center of San Leandro Boy, avoiding northwest shoreline. Fly to left of Green Tank; then estoblish departure heading.

RIGHT DOWNWIND DEPARTURE: make normal downwind departure.

LEFT CROSSWIND/DOWNWIND DEPARTURE; TOUCH AND-GO-PATTERN (27L): make crosswind turn before reaching houses.

RUNWAY 33

STRAIGHT-OUT DEPARTURE: make 45" right turn os soon as possible after takeoff. Overfly center of San Leandro Boy, avoiding northwest shoreline. Fly to left of Green Tank; then establish departure heading.

DO NOT MAKE LEFT CROSSWIND/DOWNWIND DEPARTURE.
RIGHT CROSSWIND/DOWNWIND DEPARTURE: moke normal deporture.

Oakland airport hos adopted o policy prohibiting certain aircraft operations at the north oirport. These prohibitions are described on the back of this page

OAKLAND NORTH AIRPORT
PROHIBITED AIRCRAFT OPERATIONS

The communities to the west of the Airport, the City of Alameda and its Bay Form Island complex are considered to be noise sensitive. Therefore, the use of runways 09R ond L ond 27R and L by certain classes of aircraft ore subject to prohibitions os specified below. **Compliance 1s mondatory.**

1. Prohibited Operations #1

A. Classes of Aircraft Subject to Prohibited Operations:

(I) All turbojet and turbo-fan powered oircroft.
(2) All turbo-prop powered aircraft over 12,500 pounds certificated gross takeoff weight.
(3) All four-engine reciprocating powered aircraft.
(4) All those surplus military aircraft of above types or those with allowable takeoff weights over 12,500 pounds.

B. Prohibited Operations: (24 hours daily)

No takeoffs from runways 27R ond 27L, no landings on runwoys 9R and 9L.

C. Exceptions:

The prohibitions obove shall not be applicable or effective in emergency situations which involve o substontiol risk of serious injury or damage or death or whenever Runway 11/29 is closed for construction, mointenonce or repairs or by any couse beyond control of the Airport.

2. Prohibited Operations #2

A. Classes of Aircraft Subject to Prohibited Operations:

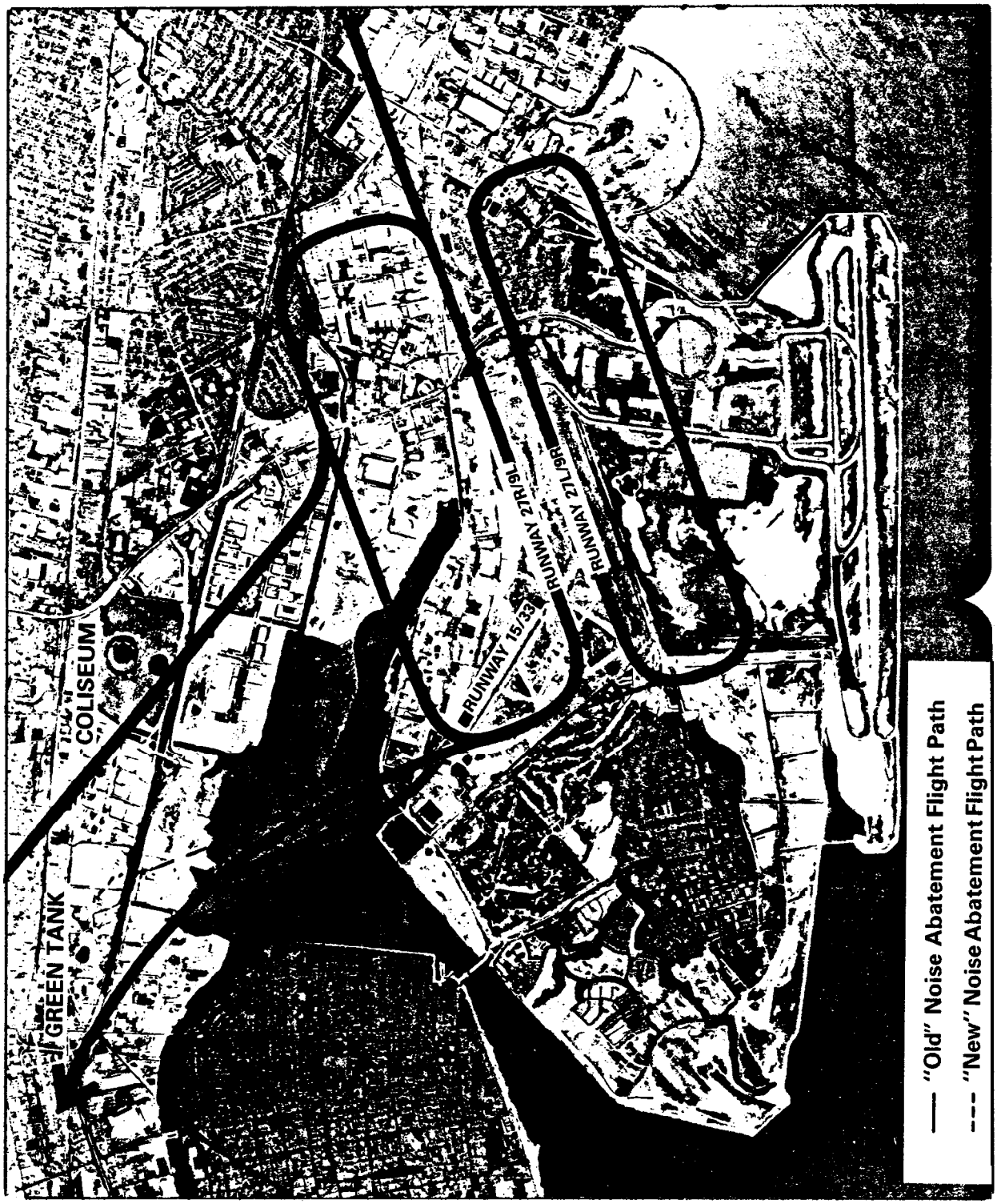
All aircraft with a certificated gross tokeoff weight in excess of 12,500 pounds when not prohibited from tokeoffs on runway 27R ond 27L.

B. Prohibited Operations:

No takeoffs from runways 27R and 27L unless takeoff runs begin at the thresholds of the runways.

C. Exceptions:

None


GREEN TANK
COLISEUM
RUNWAY 15/33
RUNWAY 27R/9L
RUNWAY 27L/9R
— "Old" Noise Abatement Flight Path
--- "New" Noise Abatement Flight Path

APPENDIX E

INSTRUCTIONSTOCONTROLLERSONNEW
OAKNOISEABATEMENTPROCEDURES

READ & INITIAL BINDER

3: 2/5/87 **EFFECTIVE:** IMMEDIATELY **ATM:** KV

REVIEW BY: ALL **REMOVE FROM BINDER:** **Training:**

PRE-DUTY: XX **FIRST SHIFT:** **GENERAL INFO:**

RETURN TO OFFICE: **FILE IN TOWER:** **DESTROY:**

SUBJECT: Airport Management Noise Abatement Procedures

The airport has placed 10 signs on the airport advising all VFR Runway 27/33 departures to fly heading 360 until crossing the Nimitz Freeway. This is to preclude aircraft from flying over Bay Farm Island and the Fernside Area of Alameda (east shore). The airport has not yet publicized this cedure other than the placing of the signs.

3 LETTER IDENTIFIER BOEING FIELD

Starting next week, the Port will be placing noise monitors at several locations on BFI (SEATTLE) and Alameda. In addition they will have at least one person on Alameda with a portable FM transceiver,on a discrete frequency to call the North Tower. They, upon occasion, will call the North Tower to ask for the full call sign of a specific departing aircraft if that aircraft has not abided by their posted noise abatement procedures;

As soon as we get a map of all the new signs and their new procedure in writing, I will forward for your information.

ve been getting good reports from the airport on all your efforts to help in the noise abatement efforts. Keep up the good work!!

BEN

1. RJ	21.	2. SS	22.
3. CM	23. MS	4. DH	24. DC
5. RE	25. HG	6. MM	26.
7.	27. CM	8.	26.
9. RI	29. MT	10. MA	30. BS
11.	31. GT	12. NG	32. VM
13. KC	33. BF	14. V	34.
15. BH	35. m	16. P/C	36. w
17. LB	37.	1	38.
19.	39.	20. KC	40.

APPENDIX F

LETTER PROM FAA ADMINISTRATOR

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Subject: ACTION: Noise Abatement Procedures

Date: JUN 5 1987

From: Administrator

Reply to Attn. of:

To: All Regional Directors

Recently there have been two midair collisions in the vicinity of airports. Although the investigations of these accidents are still ongoing, the investigators are considering whether or not noise abatement procedures established by the respective airport operators were a factor in these accidents.

I want to remind you that these procedures are required to be reviewed by the FAA from a safety perspective. The Department of Transportation's Aviation Noise Abatement Policy, which was jointly issued in November 1976 by the Office of the Secretary and the FAA, identifies the roles of the various parties in achieving noise compatibility. Regarding operational noise abatement procedures at a specific airport, the policy clearly states that the airport proprietor's role is to propose them to the FAA for implementation. The policy in this area is based upon the authority given to the FAA for the safety of flight and control of the airspace under the provisions of the Federal Aviation Act of 1958.

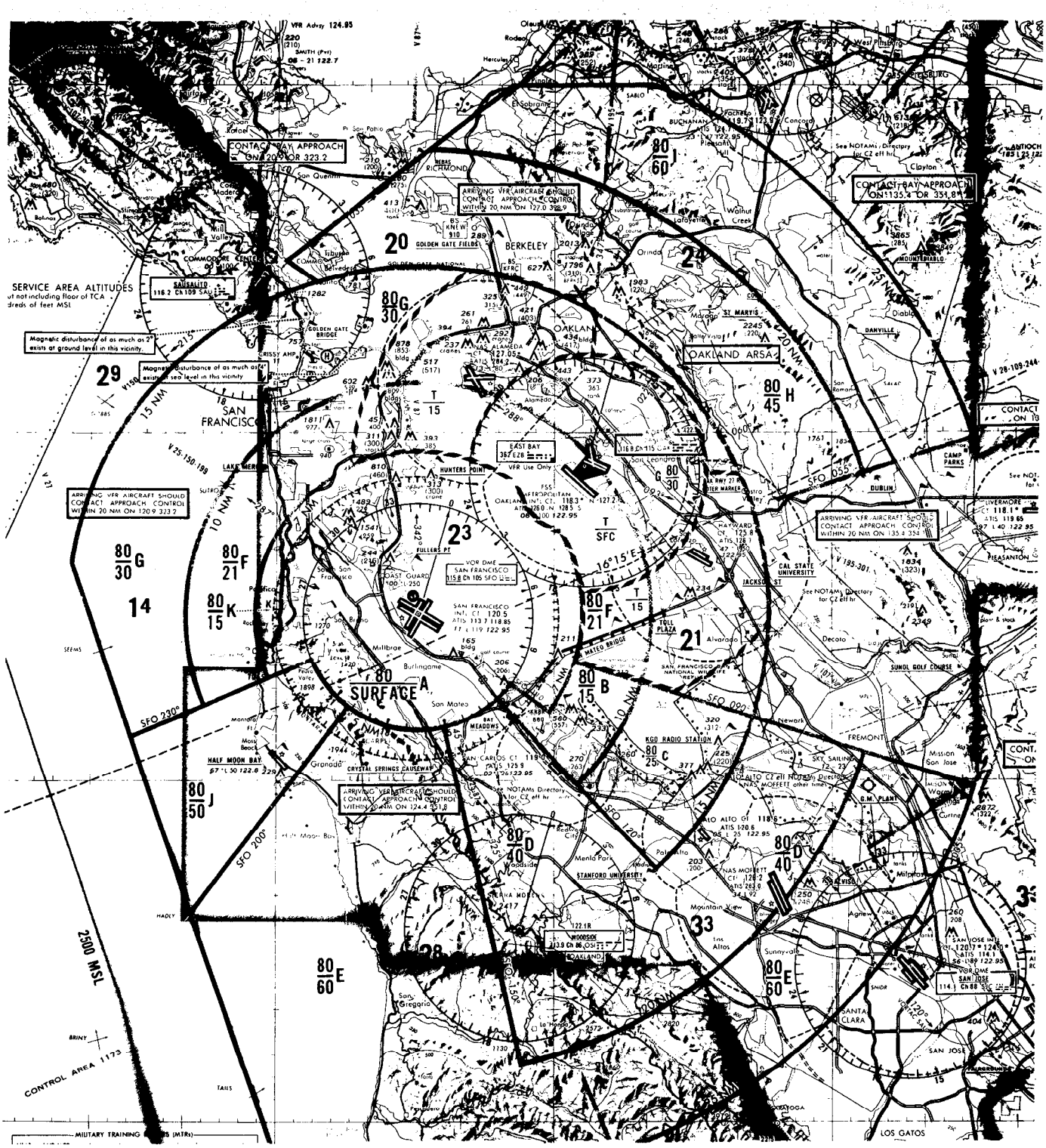
All flight procedures, regardless of whether they are IFR or VFR, are subject to FAA review and approval. It is important that you emphasize to all your personnel, regardless of their discipline (i.e., Air Traffic, Flight Standards, Airports, etc.), that when they become aware of a new or revised procedure, they take action to assure it is reviewed. The review should be conducted in accordance with the procedures you established to implement paragraph 9a(12) of Order 1050.11A, Noise Control Planning. Although this order technically was

written for FAR Part 150 studies, the review process should be used for all noise abatement flight procedures. Inaction on our part could be interpreted by some as FAA approval or endorsement of the procedure.

Donald D. Engen

APPENDIX G

SAN FRANCISCO TCA CHART



APPENDIX H

AIR TRAFFIC CONTROL TRANSCRIPT

Memorandum

Oakland ATCT
#1-Airport Drive, Box 37
Oakland, CA 94621

Subject **INFORMATION:** Transcription concerning the accident involving N75584, Cessna 172 and NSS1950, PA32 on March 31, 1987, at 1758Z

Date April 1, 1987

From: Air Traffic Manager, Oakland ATCT

Reply to Attn of Kennedy:FTS:536-7419

To Manager, Quality Assurance Evaluation Staff, AWP-506

This transcription covers the time period from March 31, 1987, 1739Z to 1749Z, March 31, 1987.

Agencies making Transmissions	Abbreviations
Cessna 172, N75584	N584
Oakland ATCT Ground Control Two	GC-2

I hereby certify that the following is a true transcription of the recorded conversation pertaining to the subject aircraft accident.

Anthony L. Stas
Area Supervisor

(1739)

(1740)

(1741)

(1742)

(1743)

(1744)

1744:18 N584 oakland ground cessna seven five five eight four

1744: 21 GC-2 cessna seven five five eight four oakland ground

(1744)

1744:24 N584 sir seven five five eight four is at the old tees with bravo i'd like to taxi three three we're a one seven two and our destination is ah livermore practice area

1744: 32 GC-2 cessna five eight four roger taxi runway three three and uh squawk one two zero zero

1744: 37 N584 five eight four

(1745)

(1746)

(1747)

(1748)

(1749)

END OF TRANSCRIPT

U.S. Department of Transportation
Federal Aviation Administration

Memorandum

Oakland ATCT
#l-Airport Drive, Box 37
Oakland, CA 94621

Subject: **INFORMATION:** Transcription concerning the accident involving N75584, Cessna 172 and NSS1950, PA32 on March 31, 1987, at 1758Z

Date: April 1, 1987

From Air Traffic Manager, Oakland ATCT

Reply to Attn of Kennedy:FTS:536-7419

To Manager, Quality Assurance Evaluation Staff, AWP-506

This transcription covers the time period from March 31, 1987, 1748Z to 1803Z, March 31, 1987.

Agencies making Transmissions	Abbreviations
Cessna 172, N75584	N584
Oakland ATCT Local Control Two	LC-2
Northstar 1950, PA32	NSS1950

I hereby certify that the following is a true transcription of the recorded conversation pertaining to the subject aircraft accident.

Anthony L. Stas
Area Supervisor

(1748)

(1749)

(1750)

(1751)

(1752)

(1753)

1753:28 N584 oakland tower cessna seven five five eight four is ah ready for takeoff on three three i'd like a right turn out

(1753)

1753:35 LC-2 cessna five eight four oakland tower roger right turn outs approved hold short of runway three three

1753:40 N584 five eight four

(1754)

1754:02 LC-2 cessna five eight four taxi into position and hold runway two seven left ah correction runway three three

1754:08 N584 five eight four position and hold

1754:54 NSS1950 oakland tower northstar nineteen fifties ah nine north with charlie

(1755)

1755:01 LC-2 northstar nineteen fifty nine oakland tower make right traffic runway two seven right report downwind

1755:07 NSS1950 is that one niner five zero

1755:10 LC-2 say again please

1755:11 NSS1950 ah northstar one niner five zero is nine miles north with charlie

1755:15 LC-2 northstar one niner five zero make right traffic runway. two seven right report downwind

1755:21 NSS1950 nineteen fifty

1755:28 LC-2 cessna five eight four runway three three cleared for takeoff

(1755)

1755:32 N584 five eight four cleared for takeoff

(1756)

(1757)

1757:33 NSS1950 nineteen fifty is over the green tank turning downwind

1757:36 LC-2 northstar nineteen fifty oakland tower not in sight cleared to land runway 27 right wind one niner zero at five

(1758)

1758:19 LC-2 northstar nineteen fifty oakland tower

(1759)

(1800)

(1801)

(1802)

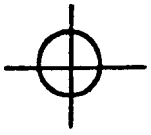
(1803)

END OF TRANSCRIPT

APPENDIX I

PILOT'S EYE VIEW OF EACH AIRPLANE

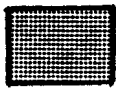
LEGEND



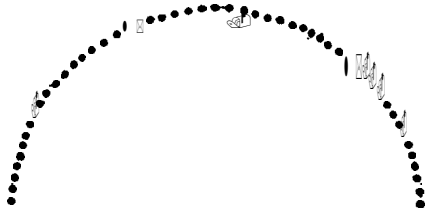
PILOT'S/COPILOT'S EYE REFERENCE POINT

BOUNDARY OF CESSNA TARGET ON PIPER WINDSHIELD

PIPER TARGET ON CESSNA WINDSHIELD



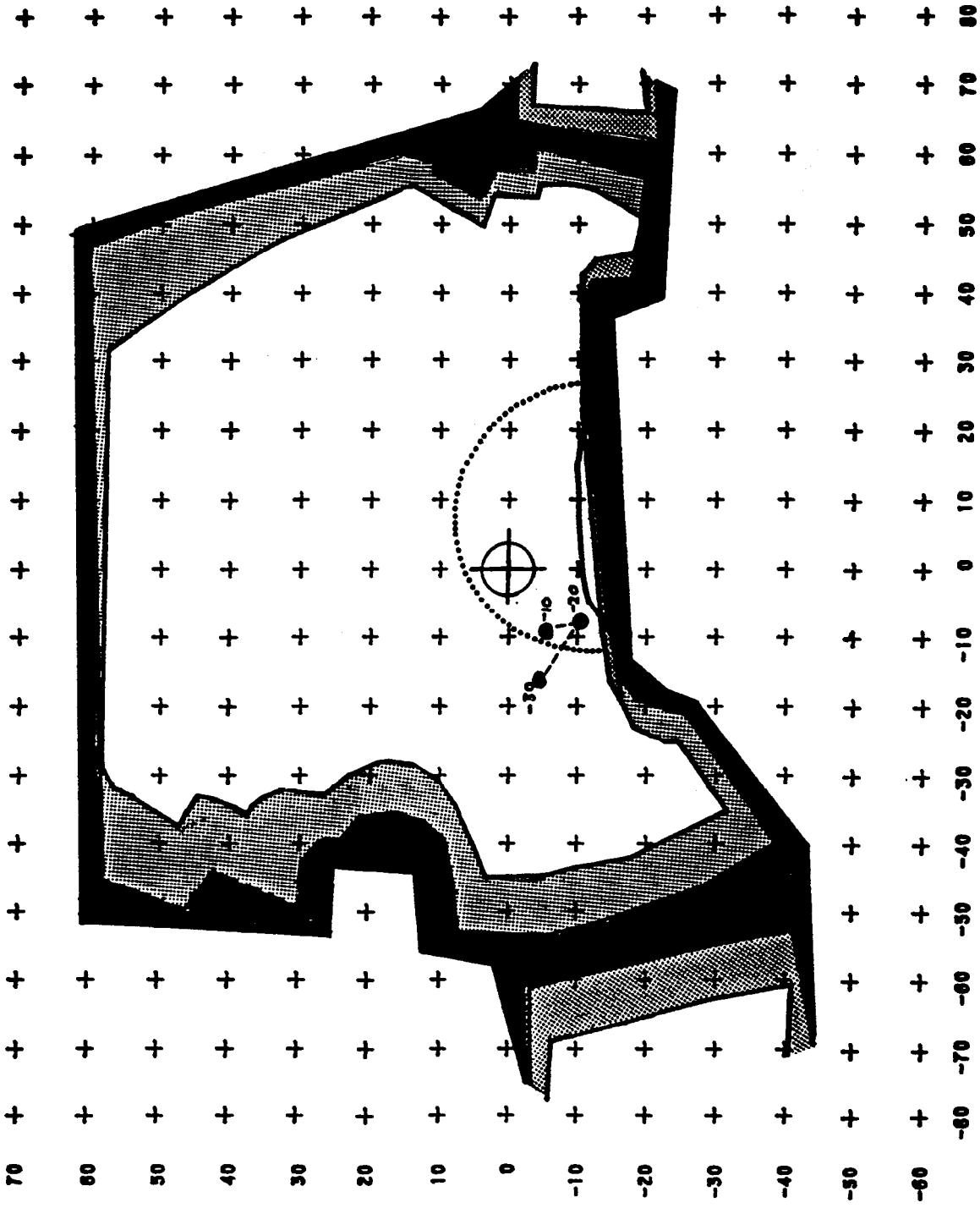
MONOCULAR OBSCURATION AREA



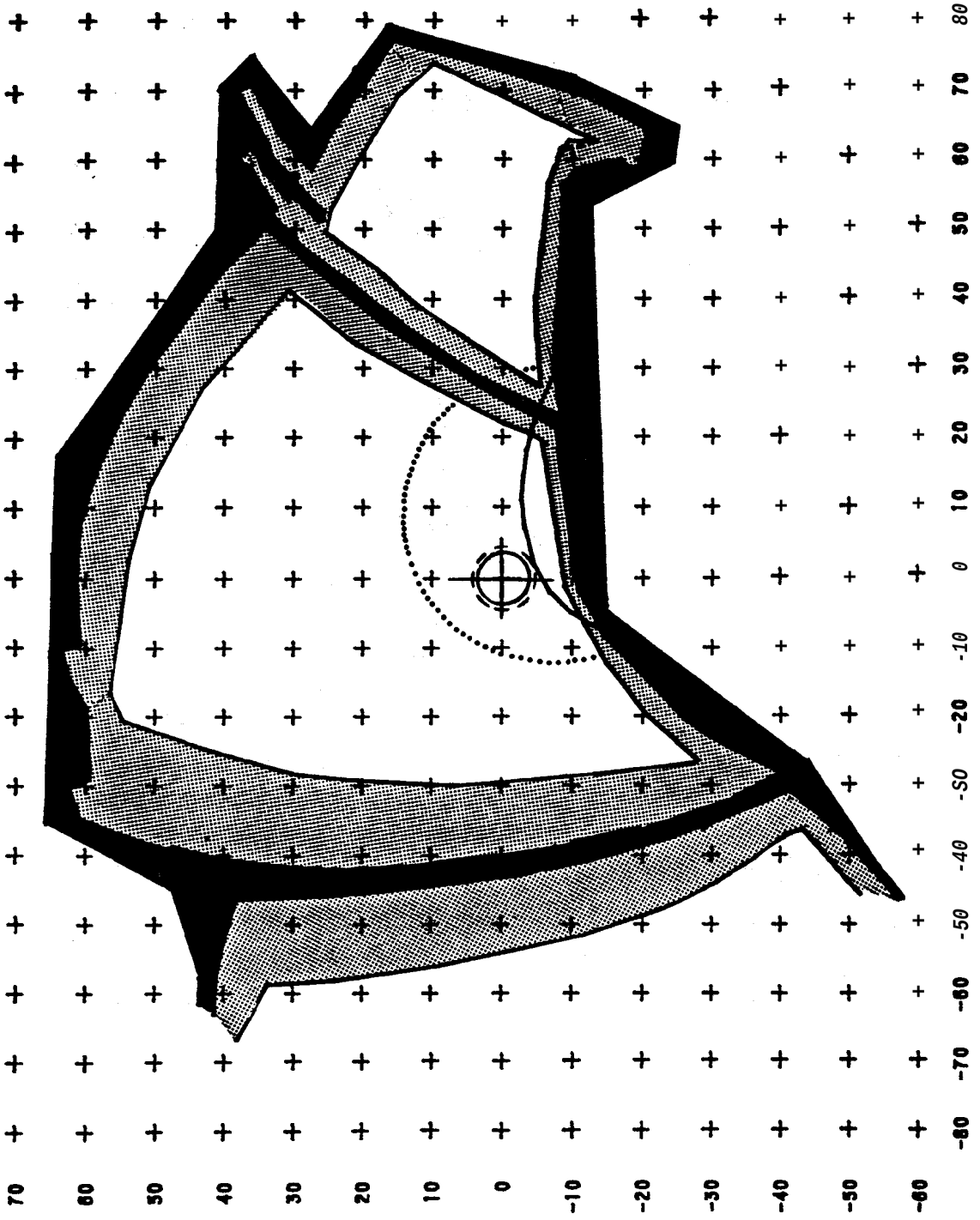
AREA OF PROPELLER SWING

-30

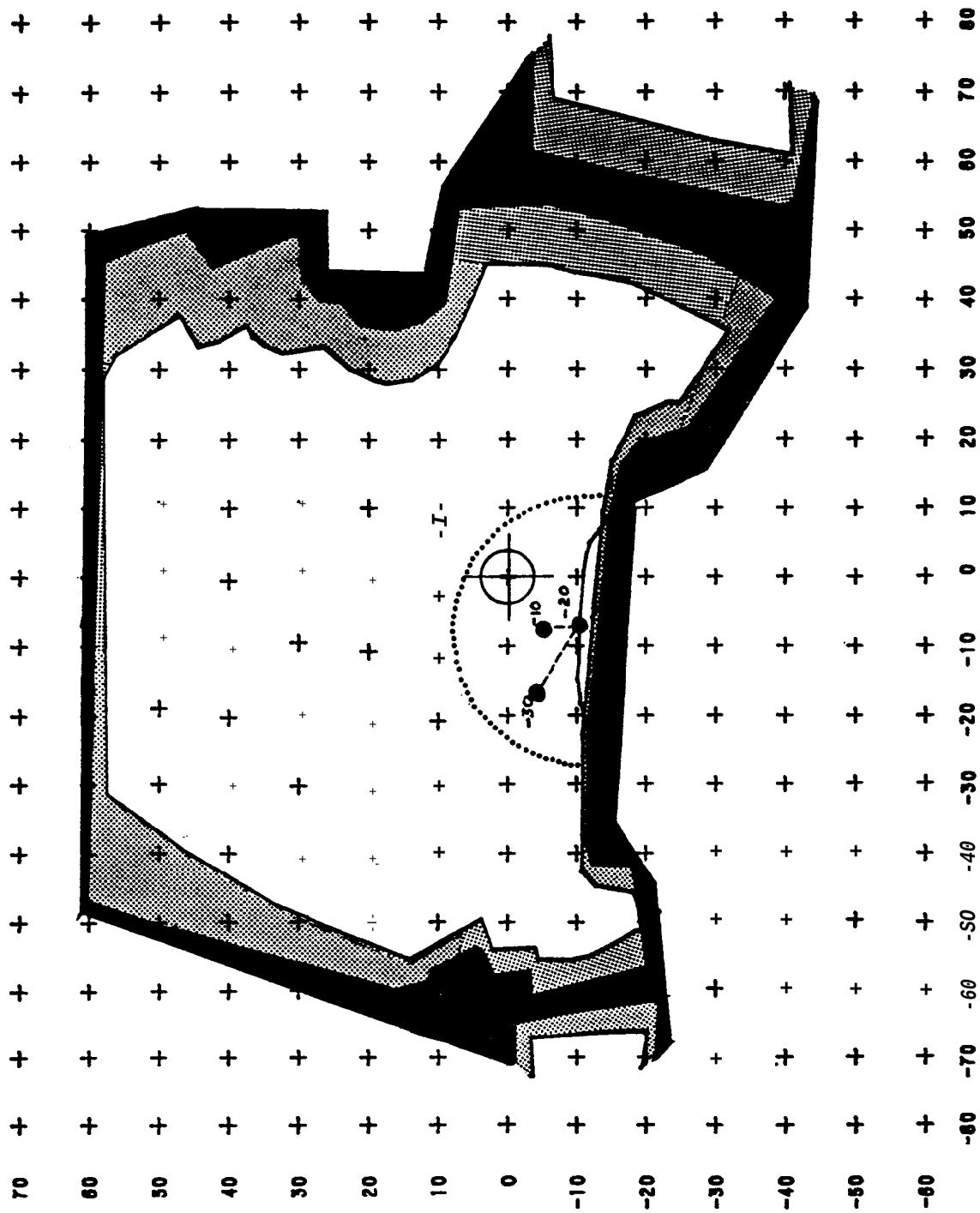
TIME BEFORE COLLISION OF TARGET



Cessna 172 N75584 - Pilot's View



Piper Lance N39614 - Pilot's View



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