

359

NATIONAL
TRANSPORTATION
SAFETY
BOARD

AIRCRAFT ACCIDENT REPORT

DOUGLAS DC-3, N142D

NEW ORLEANS INTERNATIONAL AIRPORT

(MOISANT FIELD)

NEW ORLEANS, LOUISIANA

MARCH 20, 1969



NATIONAL TRANSPORTATION SAFETY BOARD

Bureau of Aviation Safety

Washington, D. C. 20591

SA-None

FILE NO. ~~1-0045~~ → 3-1280

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3-1280

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DEPARTMENT OF TRANSPORTATION
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SYNOPSIS

N142D, a Douglas DC-3, was being operated by Mr. William Jackson of Travel Associates, Memphis, Tennessee, for the purpose of transporting sportsmen to Belize, British Honduras. The aircraft crashed and burned on New Orleans International Airport following an Instrument Landing System (ILS) approach to Runway 10. The crash occurred at 0655 c.s.t. ^{1/} on March 20, 1969. Of the 27 persons on board, 11 survived. The crew of three was among those fatally injured. The aircraft came to rest at the intersection of Runways 5 and 10. With the exception of the right wing and empennage, the aircraft was destroyed by impact and fire.

The aircraft departed Memphis, Tennessee, at 0436 and flew on an instrument flight plan to the New Orleans International Airport. The pilot-in-command and copilot hired for the flight were Allen R. Tennyson and William H. Stovall, Jr., respectively. Also in the cockpit was Marion L. Hayes, a pilot employed by Avion, Inc.

Prior to commencing the ILS approach to Runway 10, the weather conditions were reported to N142D. These conditions included a Runway Visual Range (RVR) of less than 600 feet because of fog and smoke. This condition existed before, at, and after the time of the accident.

Probable Cause

The Safety Board determines the probable cause of this accident to be the controlled descent of the aircraft into known below minima weather conditions and the failure of the crew to discontinue the landing attempt upon reaching the decision height. Contributing to the cause are existing regulations which permit an approach to be initiated in conditions well below minima, lack of clarity in the regulations in describing missed-approach procedures while following

^{1/} Except as noted, all times herein are central standard, based on the 24-hour clock.

visual cues to the runway, misinterpretation by the crew of the information received from the approach controller (in this case, the legality of landing in low visibility conditions), improper crew action at the time of initial runway contact, and poor crew judgment partially induced by fatigue, and the lack of management required for such an operation.

1. INVESTIGATION

1.1 History of Flight

N142D had been ferried from Houston, Texas, to Memphis, Tennessee, by an Avion, Inc., pilot, Marion Leo Hayes. Hayes was the only person seen disembarking from the aircraft when it arrived at the Robbins Airborne ramp at Memphis. N142D left Houston at approximately 1855, March 19, 1969.

The same evening at approximately 1910, Hayes departed the ramp in the aircraft with Allen R. Tennyson, a pilot residing in Memphis, who had been hired by Mr. William Jackson to fly N142D to Belize, British Honduras. The tower tape disclosed that only one takeoff and one landing were performed by N142D. This short flight ended when the aircraft returned to the Robbins Airborne ramp at approximately 1925. After arrival, the aircraft was serviced. The fuel tanks were filled by adding 461 gallons of 100-octane aviation fuel, making a total fuel load of 600 gallons. Two gallons of oil completed the servicing which was paid for by a credit card signed by Ralph E. Peters, one of the passengers fatally injured in the crash.

The flight left the ramp at approximately 0430, March 20, 1969, and took off on an instrument flight rule (IFR) flight plan to the New Orleans International Airport, New Orleans, Louisiana. The flight was cleared via Victor Airway 9 to cruise at 9,000 feet. The estimated time en route filed was 2 hours and 10 minutes, with an estimated fuel endurance of 6 hours. The estimated time of departure was 0400. The flight plan stated that 25 persons were aboard.

At approximately 0437, Memphis Tower contacted Memphis Air Route Traffic Control Center (ARTCC) and informed them that N142D was "... off at thirty-six" "...half a mile south end of the runway." Memphis ARTCC reported radar contact, and at 0437:35, N142D called Memphis ARTCC who replied saying that radar contact was established. N142D, upon being queried, said that the aircraft was not transponder equipped.

At approximately 0535, N142D called Jackson Radio (Jackson, Mississippi) on air/ground frequency and requested current New Orleans

International Airport weather, which was given as follows: "Moisant 1100 G.m.t. (0500 c.s.t.) observation, sky partially obscured, visibility one-sixteenth mile, smoke, fog, runway visual range 1200 feet variable 1400 feet, fog obscuring nine-tenths of the sky." N142D then requested the forecast for New Orleans for the following couple of hours. The following forecast was given to the flight and was valid from 1100 to 2300 G.m.t. (0500 to 1700 c.s.t.): "Moisant, sky partially obscured, visibility 1/16 mile in ground fog and smoke until 1500 G.m.t. (0900 c.s.t.) then becoming clear, visibility 2 miles in ground fog and smoke." N142D acknowledged and was asked if it had the current advisory for New Orleans to which the flight replied, "affirmative." The Jackson Flight Service Station gave N142D an altimeter setting of 30.00.

According to the transcript of the radio communications, at 0608 control of N142D was transferred to Houston ARTCC from Memphis ARTCC. At 0609, when approximately 3 miles north of the McComb VOR 2/, N142D contacted Houston ARTCC. At 0610, Houston ARTCC informed N142D that Moisant was below minimums. N142D replied that it understood and said that it had been told that the fog was going to burn off by the time of its arrival in approximately 1 hour. N142D asked what was the closest other airport then open. Houston ARTCC said, "Baton Rouge was reporting sky partially obscured, measured ceiling 400 overcast, 1-1/2 miles, fog, tops 2,400; McComb radio advises that a pilot reported that there was good weather at Natchez." N142D said, "It may improve as forecasted, and I'll make that decision at New Orleans." Houston ARTCC said, "(unintelligible) it looks like it was holding at one and a half miles." N142D replied, "Roger, I'll just hold until the sun got up a little and start improving; we'll fly on over and take a look, over."

At approximately 0619, Houston ARTCC said, "Douglas one four two delta if you're going to hold north of New Orleans, do you want to stay at nine thousand and hold or do you want to come on down?" N142D said, "Well (unintelligible) we are going to come over and hold; we'd like to come down and make one pass at the field and then proceed back and hold. Over."

At approximately 0642, N142D was cleared to descend and maintain 3,000 feet. N142D reported, "...out of nine for three." At 0634, the flight was given the New Orleans altimeter setting of 30.06. At the same time, control of the aircraft was transferred from Houston ARTCC to New Orleans approach control. The conversation between the controllers, according to the transcript of the Moisant Tower tapes, was

2/ McComb, Mississippi, very high frequency omnidirectional radio range, which is 72 nautical miles south of Jackson, Mississippi, VOR and 76 nautical miles north of the New Orleans VOR.

as follows:

HOU ARTCC: I got a DC three here, says he wants to come in and take a look at it. It's November one four two delta. DC three slant delta. He's over Madison at--descending to three thousand primary target your control.

MSY AR/DR: Is that five northwest of Oyster?^{3/}

HOU ARTCC: Uh, That's correct.

MSY AR/DR: Radar contact. F.G.

HOU ARTCC: H. D.

(The initials are used by controllers in signing off during the transfer of control of aircraft.)

At 0635, N142D contacted New Orleans approach control and reported, "...out of three point four for three thousand." (3,400 feet for 3,000 feet.) The following are the conversations between the aircraft and New Orleans approach and local controllers as contained in the transcripts made of the tape recordings of radio transmissions:

0635:33

N142D UH NEW ORLEANS APPROACH DOUGLAS ONE FORTY TWO DELTA OUT OF THREE POINT FOUR FOR THREE THOUSAND

MSY AR/DR DOUGLAS ONE FOUR TWO DELTA NEW ORLEANS APPROACH CONTROL MAINTAIN THREE THOUSAND PROCEED DIRECT TO THE ILS OUTER COMPASS LOCATOR AND UH WEATHER IS UH SKY PARTIALLY OBSCURED VISIBILITY ONE SIXTEENTH FOG AND SMOKE ALTIMETER THREE ZERO ZERO ZERO RUNWAY ONE ZERO VISUAL RANGE LESS THAN SIX HUNDRED FEET

0636:18

MSY AR/DR DID YOU GET THAT ONE FOUR TWO DELTA?

N142D UH ROGER FOUR TWO DELTA WE GOT IT UH

N142D UH APPROACH ONE FOUR TWO DELTA WHAT'D YOU SAY YOU HAD ON THE RVR?

^{3/} Oyster Intersection is 26 nautical miles north of the New Orleans (MSY) VOR. MSY AR/DR refers to the New Orleans (or Moisant) approach and departure radar which was being controlled from one position. The same was true of local and ground control (MSY LC/GC).

MSY AR/DR LESS THAN SIX HUNDRED FEET

N142D UH ROGER WHAT'S YOUR MINIMUMS? TWENTY FOUR HUNDRED?

MSY AR/DR THAT'S CORRECT CATEGORY TWO IS NOT AUTHORIZED UH CENTER LINE LIGHTS ARE INOPERATIVE UH NOT ADEQUATE

0636:54

N142D UH ROGER UH

0637:29

N142D UH APPROACH UH ONE FORTY TWO DELTA WE CAN SEE THE GROUND OUT HERE UH DO YOU THINK THAT'S GOING TO IMPROVE ANY SHORTLY?

MSY AR/DR SINCE ABOUT UH TWO O'CLOCK THIS MORNING IT'S BEEN GETTING PROGRESSIVELY WORSE AND UH AIRCRAFT HAVE BEEN ABLE TO SEE THE GROUND ALL NIGHT HOWEVER THE HORIZONTAL VISIBILITY IS UH AS DEPICTED ONE SIXTEENTH PREVAILING VISIBILITY AND DA LESS THAN SIX HUNDRED RVR

N142D UH ROGER UH WILL WE BE LEGAL TO MAKE A PASS AND LOOK AT IT?

MSY AR/DR I CAN CLEAR YOU FOR AN APPROACH UH YES UH YOU CAN MAKE THE LOW APPROACH IF YOU'D LIKE

0638:15

N142D UH ROGER WELL IF UH WE CAN GET CONTACT WITH THE GROUND UH WILL WE BE LEGAL TO LAND IF THAT SIX HUNDRED FEET?

MSY AR/DR FOUR TWO DELTA ACCORDING TO THE APPROACH PLATES IF YOU GET THE RUNWAY OR APPROACH LIGHTS IN SIGHT UH CORRECTION ON THAT IT SAYS UH DESCENT IS NOT AUTHORIZED WELL ACTUALLY WHAT IT SHOULD SAY IS THAT UH THE APPROACH PLATE IS UH SELF EXPLANATORY IF YOU CAN SEE THE RUNWAY OR APPROACH LIGHTS AFFIRMATIVE YOU CAN LAND

0639:05

N142D UH ROGER

(WV 1240 time signal)

0643:31

N142D APPROACH CONTROL DOUGLAS ONE FOUR TWO DELTA WOULD YOU GIVE US A VECTOR FOR AN ILS?

MSY AR/DR DOUGLAS FOUR TWO DELTA AFFIRMATIVE WHAT'S YOUR HEADING RIGHT NOW?

N142D HEADING IS ONE NINE FIVE

MSY AR/DR DOUGLAS FOUR TWO DELTA TURN RIGHT HEADING TWO TWO ZERO DESCEND AND MAINTAIN TWO THOUSAND

N142D YOU HAD ANY AIRCRAFT LAND?

0643:51

MSY AR/DR NO SIR

0644:00

N142D ARE YOUR HIGH INTENSITY STROBE LIGHTS WORKING?

MSY AR/DR AFFIRMATIVE

(WWV 1245 time signal)

0646:47

N142D APPROACH CONTROL ONE FORTY TWO DELTA YOU WANT US TO REMAIN THREE THOUSAND?

MSY AR/DR FOUR TWO DELTA NEGATIVE DESCEND AND MAINTAIN TWO THOUSAND

N142D UH ROGER OUT OF THREE FOR TWO

0648:05

N142D FOUR TWO DELTA LEVEL TWO THOUSAND

MSY AR/DR FOUR TWO DELTA SAY AGAIN

N142D UH LEVEL AT TWO THOUSAND

MSY AR/DR OK TURN LEFT HEADING ONE SEVEN ZERO

N142D LEFT TO ONE SEVEN ZERO ROGER

0648:55

MSY AR/DR FOUR TWO DELTA DO YOU HAVE YOUR CURRENT UH APPROACH PLATE WITH YOU ILS UH RUNWAY ONE ZERO? THIRTEEN FEBRUARY SIXTY NINE?

N142D UH SAY AGAIN

MSY AR/DR DO YOU HAVE YOUR APPROACH PLATE WITH YOU?

N142D AFFIRMATIVE

MSY AR/DR OK TURN LEFT HEADING ONE THREE ZERO WHAT ARE YOUR INTENTIONS?

N142D UH WE'LL MAKE A LOW PASS AND SEE IF WE CAN PICK UP THE LIGHTS

MSY AR/DR ROGER TURN LEFT HEADING ONE THREE ZERO PROCEED INBOUND ON THE LOCALIZER CLEARED FOR ILS APPROACH

0649:24 ROGER

0649:58

MSY AR/DR DOUGLAS FOUR TWO DELTA THREE WEST OF OUTER (WWV 1250 time signal) MARKER CONTACT MOISANT TOWER ONE ONE NINER POINT NINER

N142D ROGER

0650:12

N142D UH MOISANT TOWER DOUGLAS ONE FOUR EIGHT ONE FORTY TWO DELTA

MSY LC/GC DOUGLAS ON GROUND UH SAY AGAIN

N142D ONE FOUR TWO DELTA

MSY LC/GC OK DOUGLAS FOUR TWO DELTA MOISANT TOWER GO AHEAD

N142D UH ROGER WE'RE APPROACHING THE OUTER MARKER WE GOING TO MAKE A LOW PASS SEE IF WE CAN PICK UP THE LIGHTS

0650:44

MSY LC/GC ROGER

0653:56

N142D FOUR TWO DELTA GOT THE STROBE LIGHTS IN SIGHT 4/

MSY LC/GC ROGER

(WWV 1255 time signal)

4/ The above words, "Four two delta got the strobe lights in sight," was the last transmission heard from the aircraft.

0655:46

MSY LC/GC FOUR TWO DELTA TOWER

MSY LC/GC DOUGLAS FOUR TWO DELTA MOISANT TOWER

According to one of the survivors, Hayes occupied the right (copilot) seat during the takeoff and climbout from Memphis. Hayes stayed there until the aircraft leveled off at cruising altitude, after which he came back into the passenger cabin, had coffee, and talked with members of the tour and William Jackson. While Hayes was in the passenger cabin, Stovall left the cockpit, came into the passenger cabin, and went to the rest room in the rear of the cabin. At this time, Hayes was not seen in the passenger cabin. The cockpit was equipped with an additional seat called a "jump seat," which was located in the passageway to the cockpit just to the rear of the two pilots' seats.

During the final approach to New Orleans, some of the survivors remember passing over a swamp and observed trees, logs in the water, a house on stilts, an oil refinery, a red bridge, a levee, and a white stripe on the runway.

The survivors described the initial ground contact as very hard and said that the aircraft bounced, after which the sound of power being applied was heard. Several seconds passed before the second ground impact, during which some thought that the left wing struck something. One survivor described the second impact by saying that the aircraft tilted to the left and started to cartwheel. After the aircraft came to rest, fire was seen by the survivors.

1.2 Injuries to Persons

<u>Injuries</u>	<u>Crew</u>	<u>Passengers</u>	<u>Others</u>
Fatal	3	13	0
Nonfatal	0	11	0
None	0	0	0

1.3 Damage to Aircraft

With the exception of the right wing and empennage, the entire aircraft was destroyed by ground impact and fire.

1.4 Other Damage

None

1.5 Crew Information

Tennyson and Hayes possessed current air transport pilot certificates and both were type rated in a Douglas DC-3. Stovall possessed a current commercial pilot certificate with multiengine and instrument ratings. All three pilots possessed current FAA medical certificates. Tennyson did not meet the recency of experience requirements of Part 61, Section 61.47 of the Federal Aviation Regulations (F.A.R.). ^{5/} (See Appendix A for details.)

According to two persons working in a grocery store in Memphis, Stovall entered the store about 9 p.m., March 19, 1969, and purchased toothpaste, razor blades, and one can of beer. They said that Stovall was happy and excited that he was going on the hunting trip. He said that he had to get up at 3 a.m. Stovall did not appear to have been drinking, according to the witnesses.

Another witness received a telephone call from Stovall at approximately 0200, March 20, 1969. Stovall said to the witness that he was going to British Honduras in a DC-3 at 0430 and asked to be picked up at 0200 and taken to the airport. The witness arrived at Stovall's home about 0210, and they left immediately for the airport, arriving at the Robbins Airborne office at about 0225. Stovall and the witness proceeded to the aircraft to look it over. At about 0300, they went to the FAA Flight Service Station where the weather was checked. The witness stated that the briefer said that the weather at New Orleans was, "... OK - a little fog, but OK." At about 0330, a man who identified himself as Al Tennyson arrived with a man wearing a gray suit. Tennyson and the other man departed saying that they were going to check the weather and file a flight plan. The man in the gray suit asked Stovall if he had any flight time in a DC-3. Stovall said that he did not. The man in the gray suit then said that he would occupy the right seat and that Stovall should occupy the "jump seat" and watch. Tennyson said that the man in the gray suit was the man from whom the aircraft had been leased and that he would get off the aircraft at New Orleans and go to Houston, Texas. Tennyson said further that Stovall would occupy the right seat from New Orleans on. According to the witness, he, Tennyson, and Stovall went to the aircraft to be sure that they had ice and water on board and to load the aircraft. Tennyson said that he would put the heavy baggage in front and the light luggage in the rear. At approximately 0355, the witness said goodbye and went home.

^{5/} F.A.R. 61.47 Recent Flight Experience, states in part as follows:
(a) General. No person may act as pilot in command of an aircraft carrying passengers unless within the preceding 90 days he has made at least five takeoffs and five landings to a full stop in an aircraft of the same category, class, and type. This section does not apply to operations requiring an airline transport pilot certificate, or to operations conducted under Part 135.

1.6 Aircraft Information

The aircraft was certificated properly and maintained in accordance with existing regulations. The weight and center of gravity location could not be determined accurately since there was no load manifest and those responsible for the loading perished in the crash. However, using the basic information found in the Operations Manual for the aircraft, 600 gallons of 100-octane fuel (the ramp fuel load at Memphis), arbitrary weights of 160 pounds per man and 50 pounds of baggage per man, and 1,800 pounds fuel burnoff, the aircraft would have weighed 27,554 pounds at takeoff from Memphis and 25,754 pounds at the time of the accident. The maximum allowable takeoff weight at sea level, according to the Operations Manual, was 26,200 pounds. The maximum allowable landing weight was 25,346 pounds. Detailed weight information may be found in Appendix B.

1.7 Meteorological Information

At 0320, the Memphis Flight Service Station was contacted by telephone by a person who identified himself as Tennyson, requesting the New Orleans weather and the forecast for about 0600. According to a statement prepared by the Air Traffic Control Specialist who provided the information, the following was given the pilot:

New Orleans weather for 0900 G.m.t. (0300 c.s.t.) - Clear, visibility three in ground fog and smoke; temperature five three dew point five zero; surface wind one eight zero degrees at six knots; tower visibility four miles in smoke. New Orleans terminal forecast - clear until 1400 G.m.t. (0800 c.s.t.), however in view of existing New Orleans weather the area forecast was checked and following given from area forecast: Cold front moving into northwest Louisiana near daybreak and ground fog forming over land in clear area ahead of front with visibilities one to three miles in ground fog and locally below one mile after 1000 G.m.t. (0400 c.s.t.). Visibilities improving to seven miles or better by 1500 G.m.t. (0900 c.s.t.).

An IFR flight plan for N142D was filed by telephone. Further weather was received en route, as described in Part 1.1, History of Flight.

The official surface weather observations from Moisant Field and Lake Front Airport at approximately the time of the accident were:

Moisant: 0657--Partial obscuration, estimated 100 feet broken, visibility 1/16 mile, fog, smoke, temperature 53°, dew point

51°, wind calm, altimeter setting 30.08 inches, Runway 10 RVR 1,000 feet minus, fog obscuring 8/10 of the sky, surface visibility north 1/8 mile.

Lake Front (about 12 miles east of Moisant): 0655--Clear, 2-1/2 miles visibility, ground fog, smoke, 190°, 8 knots, 30.09, few cirrus.

1.8 Aids to Navigation

The ILS for Runway 10 is designed for Category II approaches, 6/ although Category II operations were prohibited because of the inadequacy of the centerline lights. Other navigational aids were operative. Inasmuch as the New Orleans International Airport and the ILS are designed for Category II, the ground components are the localizer, approach lights, high-intensity runway lights (HIRL), touchdown zone lights, centerline lights and markings, and RVR equipment for the touchdown zone.

The localizer course is 099°, and the published glide slope altitude over the outer marker inbound is 1,800 feet above mean sea level (m.s.l.). The glide slope is such that the altitudes over the middle and inner markers are 209 feet and 103 feet m.s.l., respectively. With full ILS operating, the decision height (DH) 7/ is 200 feet above the ground or 202 feet m.s.l., and the visual requirements are 1/2 mile visibility or 1,800 feet RVR. In order for a pilot to descend below

6/ Category II: An approach system requiring special authorization and special airborne and ground equipment which will enable an aircraft to descend to a lower DH and land with lower visibility. N142D was not equipped for Category II approaches.

7/ Decision Height (DH): The height expressed in feet above mean sea level where the decision must be made during an ILS or a PAR (precision approach radar) instrument approach, to either continue the approach or execute a missed approach.

the authorized DH or MDA, 8/ compliance with F.A.R. 91.117 9/ is necessary.

Following the accident, the ILS was flight checked by the FAA and found to be operating within the established tolerances.

1.9 Communications

There were no reported difficulties in communications.

1.10 Aerodrome and Ground Facilities

New Orleans International Airport (Moisant Field), New Orleans, Louisiana, is located at latitude 30°00' N. and longitude 90°15' W., at a published elevation of 3 feet m.s.l. There are three hard-surfaced runways: 10/28, 1/19, and 5/23. Runway 10 is 9,227 feet long and 150 feet wide and is designed for Category II operations, and centerline lights are installed. The approach to Runway 10 is over level terrain. The runway employs a high-intensity lighting system (HIRL), and the approach lighting system is the high-intensity approach lighting system (HIALS), U. S. Standard (A) with sequenced flashing (strobe) lights. The approach and runway light intensity is controlled from the tower and ranges from step 1 (lowest) to step 5

8/ Minimum Descent Altitude (MDA): The lowest altitude, expressed in feet above mean sea level to which descent is authorized on final approach, where no electronic glide slope is provided, or during a circle-to-land maneuvering in execution of a standard instrument approach.

9/ F.A.R. 91.117 Limitations on use of instrument approach procedures (other than Category II).

(a) General. Unless otherwise authorized by the Administrator, each person operating an aircraft using an approach procedure prescribed in Part 97 of this chapter shall comply with the requirements of this section. This section does not apply to the use of Category II approach procedures.

(b) Descent below MDA or DH. No person may operate an aircraft below the prescribed minimum descent altitude or continue an approach below the decision height unless -

(1) The aircraft is in a position from which a normal approach to the runway of intended landing can be made; and

(2) The approach threshold of that runway, or approach lights or other markings identifiable with the approach end of that runway, are clearly visible to the pilot.

If, upon arrival at the missed approach point or decision height, or at any time thereafter, any of the above requirements are not met, the pilot shall immediately execute the appropriate missed approach procedure.

(highest). The lights were on step 5 at the time of the accident.

The intersection of Runway 5 and Runway 10 is 6,300 feet from the threshold of Runway 10. The control tower and terminal buildings are in the southeast corner of the airport with the control tower located approximately 1,800 feet from the intersection of Runways 10 and 5. The fire station is approximately 1,000 feet south of Runway 10 and approximately 4,400 feet from the threshold.

1.11 Flight Recorders

No flight recorder or cockpit voice recorder was installed in N142D, nor were they required, by FAA regulations.

1.12 Wreckage

a. Runway Marks

The first indication of ground contact was found on Runway 10 at a point 1,198 feet beyond the runway approach end. Two tire scuff marks, 18 feet 8 inches apart, centerline to centerline, were evident. These marks proceeded toward the right side of Runway 10 at an angle of approximately 25°. (See Attachment No. 1, Runway Marks and Wreckage Distribution Chart for details.)

The second indication of ground contact was found 3,100 feet beyond the initial ground contact marks and 87 feet 9 inches right of the right edge of Runway 10. These second marks, consisting of tire scuff marks and propeller slash marks, were found on a taxiway. They began at a point 10 feet 5 inches from the east edge of the north-south oriented taxiway and continued off the taxiway and onto the ground in an eastward direction parallel to Runway 10. The scuff and propeller slash marks proceeded for a distance of 173 feet 9 inches, at which point the tire and propeller slash marks ended. However, a sharply defined groove, 2 inches wide and 1 inch deep, continued in the ground beyond the right landing gear track to a point 259 feet 11 inches from the start of the marks on the taxiway.

The next indication of ground impact was scrape and scuff marks on Runway 10 near the junction of Runways 5 and 10. These marks terminated under the main wreckage, which had come to rest on the north side of the junction. A red glass-like substance was imbedded in one of the scrape marks. This material was similar to the broken red cover from the left wingtip light.

b. Aircraft Structure

The aircraft fuselage structure from the cockpit to the rear cargo door was destroyed by fire.

The wing sections came to rest in an upright position on a general heading of 55° magnetic. The empennage came to rest in an inverted position in front of the wing section, with the forward end on a general heading of 235° magnetic.

The right wing was complete and included the aileron, trim tab, and wing flap. The wing was undamaged outboard of the wing attach point and all attachments were intact. The right fuel tank contained fuel. The right flap was up.

The left wing was extensively damaged by ground impact and fire. The left flap was retracted.

The empennage was complete. All control surface attachments on the empennage were intact and the controls were free to move. All control cables were free and operable between the control surfaces and severed ends. The control surfaces were undamaged. The rudder tab measured 1 inch throw to the right (aircraft nose left). The elevator trim tabs were found to be 1-1/2 inches up (aircraft nosedown).

The major airframe structure and all flight control surfaces were in the wreckage area. There was no evidence of any in-flight separation of the aircraft structure or its components.

c. Cockpit Area and Instruments

The cockpit area and all instruments and radios were fire damaged. All instruments, except the pilot's airspeed and suction gauges, were recovered. All instrument panels had separated from their mounts and were found separately.

The captain's and first officer's barometric altimeters were found and both read 30.05. (Reported barometric pressure was 30.08 at Moisant Field at 0657. New Orleans approach control transmitted an altimeter setting of 30.00 to N142D at 0635.)

The flap and landing gear handles were found in the UP position. The elevator trim wheel was broken, and the indicator was positioned at 1° aircraft nosedown.

The following radio units were taken to Trans-Texas Airways Avionics Shop, Houston, Texas, for further inspection in an attempt to determine the frequency to which each unit was tuned. Fire damage precluded frequency determination from external sources.

Teardown inspection revealed the following:

VHF navigation receiver, R540/ARN-14C, S/N unreadable was tuned to 109.9 MHz.

VHF navigation receiver, R540/ARN-14C, S/N 6249, was tuned to 109.9 MHz. (The ILS localizer frequency at New Orleans is 109.9 MHz.)

VHF Transmitter, 17L-4, S/N, was tuned to 119.9 MHz (the New Orleans or Moisant tower frequency).

VHF Transceiver, 618F-1C: Damage precluded determination of frequency.

ADF Receiver was tuned to Band 200-410. The remaining data was obliterated.

d. Powerplants and Propellers

Both engines were recovered. The left had separated from the aircraft and was found nearby. The right was attached to the wing section by control cables only and exhibited fire damage. Both engines were inspected externally and internally and revealed no evidence of preexisting discrepancies or malfunctions. No evidence of in-flight fire was found. All engine oil and fuel filters were free of foreign materials.

The propellers were disassembled to determine the propeller blade angles at impact, by measurement of the angle of the mark generally found on the blade spider shim plates. All shim plates on both propellers were found to be so marked, and the following blade angles were determined by this method:

<u>Position</u>	<u>Blade No.</u>	<u>Angle</u>
Left	1	18°
	2	18°
	3	18°
Right	1	19°
	2	19°
	3	19°

The left propeller dome pitch markings were at 18°, and the low pitch stop lug was at the low pitch stop.

The right propeller dome pitch markings were at 29°, and the low pitch stop lug was 11° away from the low pitch stop.

All blades of the left propeller were bent or twisted in varying degrees toward the flat side of the blade. Two blades of the right propeller were bent or twisted toward the flat side, and one blade was bent toward the cambered side approximately 180°.

1.13 Fire

Fire occurred after ground impact. Although the aircraft crashed on the airport, this fact was not known for approximately 5 minutes. The firefighting equipment did not arrive for an additional 5 minutes. The events which are related to these circumstances follow:

No communications were received from N142D after the words, "Four two delta, got the strobe lights in sight." The tower called the aircraft several times afterward, but received no answer. Departure radar was contacted by the tower to see if any targets were observed. None of the targets seen was identified as N142D. At about 0700, the tower was called on tower frequency by a technician on the airport who had been near a radar facility located approximately 900 feet north of the intersection of Runways 10 and 5. The technician had driven toward the tower and requested permission to cross the active Runway (10). He saw the aircraft burning and asked the tower if the emergency vehicles were on the aircraft. This was the first the tower knew that N142D had crashed. (The tower is approximately 1,800 feet from the intersection of Runways 5 and 10.) Upon receiving the information, the controller in the tower lifted the receiver on the emergency telephone. This action causes the alarm to ring in the fire station located about 2,950 feet from the scene. The fire station personnel responded and departed in less than a minute, but their travel to the crash site was hampered by reduced visibility caused by the fog. The emergency equipment arrived at the burning aircraft at approximately 0702 and extinguished the fire.

1.14 Survival Aspects

N142D passenger cabin was arranged for 26 people with seven rows of double seats on the right side and 6 rows of double seats on the left side. Window exits were on each side at row 6. One seat in row 1 and another in row 7 were the only unoccupied seats at the time of the accident. Three survivors were from row 2, two survivors were from row 3, and two survivors were from each of rows 5, 6, and 7. Nine of the 11 survivors were seated on the right side of the cabin. The 16 victims, including the crewmembers, were severely burned.

At 0709, the Kenner Fire Department Central Fire Station (Kenner, Louisiana), located 5 blocks from the airport but 1.6 miles from the airport entrance, received a call from the Jefferson Parish Sheriff's office requesting an ambulance. At 0710, the Moisant tower also called for an ambulance. The Kenner Fire Department was advised that fire equipment was not needed. The

Kenner ambulance radio log indicated arrival at the scene at 0714. The ambulance first departed for the nearest hospital, 9.9 miles from the scene at 0724, and arrived at 0736. Hospital admitting records show time stamps ranging from 0741 to 0803.

The consultant pathologist of the National Transportation Safety Board examined the bodies of the 16 occupants fatally injured. Detailed autopsies were performed on the three crewmembers. A summary of the pathologist's findings follows:

All victims, both passengers and crew, generally showed minimal to moderate injuries due to decelerative forces.

Severe burns were the most common feature in all victims.

In both passengers and crew, where fractures were noted, the extremities were primarily involved, with lower ones predominating.

Obvious head injury was distinctively absent in all victims except for one crewmember.

The copilot (Stovall) was relatively free of major traumatic injuries but exhibited severe burns.

The other pilots had thoracic injuries which were severe enough to be fatal.

Results of the carbon monoxide tests revealed carboxy-hemoglobin saturations below 10 percent in seven cases, including the three crewmembers; four cases were in the 10 to 19 percent range; two cases each were in the 20 to 29 percent and 30 to 39 percent range; and one case was in the 40 to 49 percent range.

Results of tests for lactic acid concentration were unremarkable, and no ethyl alcohol was found. No drugs were found except some Chlortrimeton (chlorpheniramine) in the specimens from pilot Hayes. Chlortrimeton is an antihistamine commonly found in non-prescription cold remedies.

1.15 Tests and Research

None.

1.16 Other Information

Determination of the seating arrangement of the pilots was considered highly important. Therefore, arrangements were made for an associate of Marion Leo Hayes to listen to a copy of the tapes covering the transmissions made from N142D. The tapes include the departure from Houston and arrival at Memphis on March 19, 1969; the local flight at Memphis on the evening of March 19; the departure from Memphis during the early morning of March 20; and the approach at New Orleans on March 20, 1969. It is the opinion of the witness that Hayes made the transmissions to Houston tower and the Memphis approach control, tower, and local controller on the flight from Houston to Memphis on March 19. He believes that part of the transmissions made on the short flight on the evening of March 19 were made by Hayes. It is the witness' opinion that all of the transmissions made during the departure from Memphis on March 20, 1969, and all of the transmissions made to New Orleans approach control and tower were made by Hayes. While the "jump seat" station had a headset, no microphone jack was installed.

The documentation of the removal of bodies from the wreckage revealed that the body of Hayes was to the right (when viewed facing forward in the aircraft) of the bodies of the other two pilots.

During the investigation, it became apparent at an early stage that the problem of determining who was the operator of the aircraft might be complex. Avion, Inc., the registered owner, had removed the aircraft from its operating specifications and executed a dry lease agreement (lease of the aircraft only), which was signed by Mr. William Jackson, the organizer of the trip, and Mr. John Hamnett of Avion, Inc. On the basis of this lease, it does not appear that this was an operation being conducted by Avion, Inc. under its certificate. The evidence also indicates that the sportsmen passengers were not the operators so it was not a club operation. It must, therefore, be concluded that Mr. Jackson was the operator, although he did not have authority to conduct an operation "for hire or compensation" nor was he the holder of a commercial operator's certificate or an air carrier operating certificate.

While Mr. Jackson should have been properly certificated under Part 121 and if so certificated conducted the flight under the applicable provision of that regulation, he was not a certificate holder at the time of this flight, so the operational requirements of Part 121 were not applicable. Thus, the operation was being conducted under Part 91 of the Federal Aviation Regulations.

2. ANALYSIS AND CONCLUSIONS

2.1 Analysis

The flight was uneventful until N142D was handed off from Memphis ARTCC to Houston ARTCC. At this point, the crew inquired about the weather and stated that they would, "... take a look."

The investigation of the aircraft structures, components, systems and powerplants revealed no indication of in-flight failure, malfunction, or other abnormalities which could be related to the cause of the accident.

The causal area, therefore, primarily involves the actions and judgment of the crew in attempting an approach and landing in the known adverse weather conditions which existed on the airport; and also the action of the New Orleans controllers in advising N142D that a landing was permissible if the lights could be seen. In this regard, a detailed review at the applicable portions of F.A.R. Part 91 is pertinent in order to consider the possibility of the crew and/or the controllers being misled by ambiguity.

The runway marks, the observations of the surviving passengers, and the final transmission from N142D indicate that the ILS approach was performed satisfactorily insofar as general adherence to centerline alignment and glide path control were concerned. The first ground contact was to the right of centerline and 1,198 feet from the threshold--a reasonable position for landing, considering the extremely poor visibility. The second ground contact was 3,100 feet beyond the initial contact point. Undoubtedly, the aircraft did not bounce the entire distance, but was flown. The landing gear was extended when the aircraft touched down initially since there were no propeller marks at this point. The landing gear was retracted when the aircraft contacted the ground the second time because the propeller marks on the ground began immediately, and distinctly revealed that both propellers were striking the ground. The uniformity of the two sets of propeller slash marks establishes that the aircraft was in a fairly wings-level attitude when the ground was contacted the second time.

The aircraft was at least 400 pounds overweight at the time of the accident. Even so, with both powerplants operating, the pilot should have been able to execute a successful missed approach even after the initial touchdown, since a DC-3 is not a difficult aircraft with which to execute a missed approach, provided the proper technique is used. That he failed in his attempt could have been the result of the flaps being prematurely raised. The DC-3 two-engine go-around procedure calls for the flaps to be set at the 1/4 down

position. If the flaps are FULLY raised, the tendency is for the aircraft to settle unless corrective action is accomplished by raising the nose so as to increase the angle of attack sufficiently to compensate for the loss of lift produced by the flap retraction. If, however, the airspeed is too low, the increase in angle of attack may not correct the situation even with maximum power, and the aircraft will settle. Since the aircraft was overweight, it is highly probable that sufficient airspeed was not being maintained for the weight. If such were the case and if the flaps were prematurely retracted (they were found in the fully retracted position), the aircraft could very well have settled and struck the ground in the level attitude reflected by the marks found at the point of second ground contact. While the activities of the crew in the cockpit cannot be definitely known, the Board believes, nevertheless, that the loss of flight control after the first touchdown and bounce was the result of improper crew action in the cockpit, resulting in a premature flap retraction and a subsequent settling, which was not arrested in time to avoid striking the ground.

Inasmuch as weather plays a prime role in the events leading to the accident, the adequacy of the weather information given the crew is important. There is no doubt that the crew was well informed of the weather. Not only did they receive more than an ample briefing prior to departure from Memphis, but they were also well informed of weather developments as the flight proceeded toward New Orleans. When Houston ARTCC was contacted by N142D, the discussion of the weather was a dominant part of the conversation. The flight asked about other airports that were open and received information about Baton Rouge and Natchez, both of which were reporting better weather than New Orleans. The transcript of the communications reveals that the initial intention was to hold until the sun rose a little higher and the weather started to improve. The crew then stated that they would fly over and take a look. A short time later, after a frequency change, Houston ARTCC asked the crew if their desire was to stay at 9,000 feet and hold north of New Orleans, or come down. N142D replied, "... we'd like to come down and make one pass at the field and then proceed back and hold" Although the weather was below the minima for the landing, the crew of N142D nevertheless elected to make an approach (or as the crew called it, a pass) at the airport. Visibility was decreasing, and the crew was aware of this. Passing Jackson, Mississippi, the RVR was 1,200 feet variable 1,400 feet. As soon as the flight was handed off to New Orleans approach control, it was informed that the RVR was less than 600 feet. The ATIS (Automatic Terminal Information Service) was reporting RVR less than 1,000 feet, but there is no way of determining whether N142D had tuned to the ATIS frequency at any time during the flight. The

crew of the aircraft stated to New Orleans approach control that they could see the ground where they were. Approach control replied that other aircraft had reported the same thing; but that the horizontal visibility was less than 600 feet. New Orleans approach control also said that the weather had been getting progressively worse since 2 o'clock in the morning. In view of the weather information provided N142D and the actual weather encountered, the approach should not have been commenced.

The variety of altimeter settings available to N142D is significant. Houston ARTCC gave the New Orleans altimeter setting as 30.06. Shortly thereafter, New Orleans ATIS was broadcasting 30.04. At about the same time, New Orleans approach control reported to N142D that the altimeter setting was 30.00. The correct altimeter setting was 30.08. However, examination of the instruments found in the wreckage revealed a setting of 30.05 on both the captain's and copilot's altimeters. The difference between the settings on the aircraft's altimeters and the correct setting is .03 inches or approximately 30 feet. This is not considered to have been involved with the cause of the accident because the difference is so slight and because the difference is in the safe direction; that is, the aircraft would have been higher than the altimeters indicated.

The lack of good judgment was manifested in the actions of the pilots of the DC-3 before the trip started in that they elected to make the flight with a copilot completely without experience in a DC-3 and a pilot-in-command with no recent experience in a DC-3. The only pilot on board qualified to make the flight was Hayes, and he was not acting as pilot-in-command. In this regard, it is believed that during the approach and crash, Hayes occupied the right or copilot's seat and Tennyson the left, or pilot's seat. Stovall, the man hired as copilot, occupied the "jump seat." This belief is proved in several ways. The voice on the radio during the approach was identified as that of Hayes. There was no microphone at the "jump seat" station so it is improbable that radio communications were being effected from that position. The location of the bodies in the wreckage and the type of injuries suffered by the crew strongly suggest that the cockpit seats were occupied as described. Before takeoff, Hayes was heard making the statement to the effect that he would fly in the right seat to New Orleans and Stovall should occupy the "jump seat" and watch.

Each of the crew must have slept only a very few hours before departure from Memphis. There is evidence that Stovall was in a grocery store at 9 p.m. the evening before the accident. He was awake at approximately 2 a.m. the morning of the accident. Tennyson

and Hayes flew the evening before the accident until approximately 7:26 p.m. Certainly the crew would have been at a higher level of competency had they acquired more rest.

Hayes and Tennyson had flown together once previously and that was on the eve of the flight to New Orleans. Crew coordination would not have been on a par with that of a crew who had flown together frequently.

Although the Board believes that a landing should not have been attempted, consideration must be given to the possibility that a clearance to land may have been inferred by the words spoken by New Orleans approach controller relative to the legality of landing with 600 feet RVR. The questions asked by N142D show a definite desire to land. The flight first asks if it would be legal to make a pass and look at it, and then asks if they would be able to land with 600 feet RVR if they could get contact with the ground. (It is noteworthy that N142D constantly refers to 600 feet as if it were the actual visibility. The RVR was in fact less than 600 feet and N142D was so informed.) The controller answered N142D by saying, "... if you can see the runway or approach light affirmative you can land " N142D then asked if any aircraft had landed (to which the answer was no) and whether the high-intensity lights were working (to which the answer was yes). A little later, after affirming that they had an approach plate, N142D was told to turn to a heading of 130° and was asked, "...what are your intentions?" N142D answered, "... We'll make a low pass and see if we can pick up the lights." The final transmission from the aircraft was, "Four two delta, got the strobe lights in sight." The implied intent of the crew throughout these communications was directed toward landing the aircraft regardless of the visibility. The constant reference to the lights strongly suggests that if they were successful in seeing them, they would land. Apparently, the intent of the controller was not to authorize a landing with the weather conditions below minima, and one would expect air transport pilots not to have attempted a landing.

On the other hand, since no landing clearance was requested and none given, the possibility arises that the initial impact with the terrain was not a landing, but rather the result of delaying too long before executing a missed approach and thereby inadvertently contacting the ground. The severity of the initial impact tends to support this theory since such a contact could easily occur in the poor visibility which would hamper attitude control of the aircraft if the pilot were flying solely by ground reference. However, arguments against this possibility are the fact that the pilot lacked recent experience and would be more apt to strike the ground harder in a landing attempt than if he were

more proficient in the aircraft, and the fact that the altimeters in the aircraft were probably reading lower than the actual altitude of the aircraft, which would tend to cause the pilot to execute a missed approach sooner. It is believed, however, that the evidence indicates that the intent of the crew before commencing the approach was to land if they succeeded in seeing the approach or runway lights.

The Terminal Air Traffic Control Handbook (7110.8) describes the procedures for below minima conditions. The information is found in Chapter 4, section 11, paragraph 535, the applicable parts of which follow:

When an available official weather report indicates weather conditions are below the minima for the particular approach being executed or to be executed:
(NOTE: The Weather Bureau report, RVR reading, and/or runway visibility report, as appropriate, constitute the official weather report.)

a. Issue the weather report to each arriving IFR aircraft.

b. Inform other than military aircraft or scheduled air carrier aircraft that the reported weather is below published minima and:

(1) Request the pilot to state his intentions:

Phraseology:

WEATHER (weather report). THIS IS BELOW PUBLISHED MINIMA FOR (type of approach) APPROACH. ADVISE INTENTIONS.

(2) After receipt of the pilot's intentions, take the following actions:

(a) Issue approach clearance or other clearances, as appropriate, according to the pilot's stated intentions and the traffic situation.

(b) Qualify each landing clearance issued under these conditions with the phrase, "if you have landing minima."

Phraseology:

CLEARED TO LAND IF YOU HAVE LANDING MINIMA.

Clearly, the controller complied with the provisions of the Terminal Air Traffic Control Handbook even though the phraseology

was not, in every instance, that prescribed in the handbook. The phrase, "if you have landing minima," was not spoken because no landing clearance was given. It is believed, however, that the controller would have been wise to have ended his discussion with that phrase when he was replying to the query of N142D as to the legality of landing with 600 feet RVR. This may have precluded any misinterpretation. There is no reason, however, to believe that the controller would not have uttered the phrase, "if you have landing minima," if N142D had requested a landing clearance.

Since N142D was operating under Part 91 of the Federal Aviation Regulations, the conditions under which an approach and landing can be made are contained in section 91.116 (attached). The regulations governing the approach procedures are those permitted under Part 97 of the F.A.R.'s and, in this instance, consist of the ILS approach for New Orleans, Runway 10, as portrayed on the applicable Jeppesen or Coast and Geodetic approach plate. F.A.R. 91.117 prescribes the conditions under which a pilot may descend below MDA or DH. The doubt on the part of the crew of N142D, and the hesitation of the New Orleans approach controller in answering the questions of the crew relative to the conditions under which a landing could be made, highlight the possibility that the regulations, particularly section 91.117 (attached), may be lacking in clarity to the degree that misinterpretation by pilots is quite feasible. It is possible that a pilot may believe that he could land regardless of the visibility, provided the conditions of section 91.117(b) are met. The conditions necessary to operate an aircraft below MDA or DH are:

- (1) The aircraft is in a position from which a normal approach to the runway of intended landing can be made; and
- (2) The approach threshold of that runway, or approach lights or other markings identifiable with the approach end of that runway, are clearly visible to the pilot.

The pilot is required to execute a missed approach if, upon arrival at the MDA or DH, or any time thereafter, any of the two requirements are not met. Nothing in the two conditions refers to visibility. Therefore, if a pilot reached the DH and saw the approach lights (as did N142D) and he were also in a position from which he could make a normal approach to the runway by following the approach lights, he would apparently not have to execute a missed-approach procedure, even though the visibility were less than the prescribed RVR since all conditions of 91.117(b) would have been met. The intent of 91.117(b) is certainly not to permit landings when the weather conditions are such that the minima are less than those described in the appropriate publications. The

wording is such, however, that some pilots could be misled.

Section 91.116, in setting forth how a pilot may take off and land under IFR conditions, differs from a similar operation under Part 121 of the Federal Aviation Regulations. The difference is that under Part 121, an approach cannot be started if the airport is below minima for the particular type of approach desired. However, if an approach is initiated while the airport is at or above minima and then goes below minima while the aircraft is on approach, the aircraft may continue to the MDA or DH, whichever is applicable, and may continue to a landing if the conditions upon arrival at MDA or DH are at or above the prescribed minima. Under section 91.116, the restriction is on the landing and not on the approach. Thus a pilot may request and receive clearance to make an approach even though the weather at the time is below the minima prescribed. Therefore, the action of N142D was perfectly legal in requesting an approach and the controller's response was legal in giving an approach clearance. Had the provisions of Part 91 been similar to Part 121 in this regard, N142D could not have initiated the approach and the controller could not have cleared the flight to make it, and the accident would not have occurred. It is quite possible for an aircraft with a load of passengers to be forbidden to make an approach while the same aircraft with the same passengers and the same pilots can be permitted to make an approach in the same conditions, simply by arranging for the aircraft to be operated under a different part of the Federal Aviation Regulations.

The Board believes that more passengers could have survived if the fog existing at the time had not precluded observation of the accident, thereby making it impossible to effect a timely notification of the firefighting/rescue equipment and personnel. It is known that at least one victim survived impact and was conscious, but even with assistance from fellow passengers, he was unable to extricate himself from the wreckage.

Injuries because of decelerative forces were not predominant. The most common fatal injury was severe burns. Where fractures occurred, they were apparently the result of structural collapse, which though normally not fatal, in this case trapped the victims who were then exposed to fire.

Lower levels of carbon monoxide saturation in 11 of the 16 fatalities suggests that there was no sustained period of smoke inhalation and asphyxiation. Instead, death was caused by exposure to heat.

Survivability in this accident was primarily a function of location within the aircraft inasmuch as structural breakup or collapse following impact trapped most of those who did not survive.

Finally, the Board would like to invite particular attention to the fact that the numerous deficiencies, unsafe practices, and violations of regulations, which appear to have been involved in this operation, are all too typical of operations that are organized in the manner indicated by the facts in this case. Trip organizers who are often unfamiliar with flight operating procedures and the regulations, lease aircraft of which they have little or no knowledge, and employ pilots who may or may not be competent for the purpose of conducting commercial operations with large aircraft. It is not unusual that such operations are characterized by safety problems such as those found to be present in this operation. The quality of management required for a safe operation appears to have been absent and was a significant factor in this accident. The Board believes that a passenger who purchases transportation, irrespective of the nature of the operation, is entitled to the protection of safety regulations appropriate to a commercial operation.

2.2 Conclusions

(a) Findings

1. There was no failure or malfunction of the aircraft, powerplants, propellers, or other systems, and the aircraft was properly certificated.

2. The crew was properly certificated for the flight, but the pilot-in-command hired for the flight was not qualified under the provisions of section 61.47 of Part 61 of the Federal Aviation Regulations. The Avion pilot was qualified for the flight but was not part of the crew hired. The copilot, while totally inexperienced in a Douglas DC-3, was nevertheless qualified, under existing regulations, to act as copilot on the flight.

3. The cockpit seats occupied by the crew when the aircraft crashed were as follows: Left seat, Allen B. Tennyson; right seat, Marion Leo Hayes; and the "jump seat," William H. Stovall, Jr.

4. RVR on Runway 10 was less than 600 feet, which is less than the minimum for an ILS approach.

5. The crew was well informed of the weather conditions before the approach was initiated.

6. Under existing regulations, clearance to make an approach was legal.

7. Descent below the decision height (DH) was permissible under present provisions of F.A.R. 91.117(b).

8. Landing clearance was not requested by N142D nor given by the tower controller.

9. The crew may have interpreted the controller's words, "... if you have the runway or approach lights in sight, affirmative, you can land," as a landing clearance.

10. Flight control was lost while the crew was attempting a go-around following recovery from a hard landing.

11. Part 91 of the Federal Aviation Regulations permits an approach to be made when the reported weather is below the published minima, while Part 21 does not allow an approach to be initiated.

12. Had the fire and emergency equipment arrived at the accident scene more rapidly, the lives of more passengers probably could have been saved.

13. The fire and emergency equipment were delayed by fog and by the time lapse before notification of the accident. Dense fog prevented the sighting of the accident until approximately 5 minutes after the crash.

(b) Probable Cause

The Safety Board determines the probable cause of this accident to be the controlled descent of the aircraft into known below minima weather conditions and the failure of the crew to discontinue the landing attempt upon reaching the decision height. Contributing to the cause are existing regulations which permit an approach to be initiated in conditions well below minima, lack of clarity in the regulations in describing missed approach procedures while following visual cues to the runway, misinterpretation by the crew of the information received from the approach controller (in this case, the legality of landing in low visibility conditions), improper crew action at the time of initial runway contact, poor crew judgment partially induced by fatigue, and the lack of management required for such an operation.

3. RECOMMENDATIONS

Prior to this accident, on January 10, 1969, the Safety Board recommended to the Administrator of the Federal Aviation Administration that Section 91.117 and Section 121.649 of the Federal Aviation Regulations be amended to prohibit any approach below 200 feet above

field level unless the pilot has the runway threshold in sight and to require that he have the same in sight during the remainder of the approach. (Piedmont FH-227 accident, Charleston, West Virginia, 8/10/68.)

The Administrator's reply of January 28, 1969, was as follows:

* * * * *

1. Amend FARs 91.117 and 121.649. While we do not agree that regulatory amendments per se will contribute directly to a solution of this problem, we recognize that the special VFR provision of FAR 121.649(b) may be impractical. Accordingly, we are considering rulemaking action to eliminate this provision. We do not intend to amend FAR 91.117 as we believe that requiring pilots to maintain 200' until they have the runway threshold in sight could lead to additional high rate of descent problems. For precision approaches, we have presently approved minimums as low as RVR 1800', DH 200'. A pilot, when making an approach to these minimums, may not have the runway threshold in sight at minimums; however, he may continue the approach provided he is in a position from which a normal approach can be made and the approach lights or other markings identifiable with the approach end of the runway are clearly visible and remain so thereafter during the approach.

* * * * *

After this accident, the Safety Board, on November 26, 1969, recommended to the Administrator of the Federal Aviation Administration:

- (1) That section 91.116 of the F.A.R. be changed to agree with the provisions of section 121.653 and the similar requirements of Parts 123 and 135 in order that the approach be restricted as well as the landing.
- (2) That section 91.117 be amended to the effect that in no event shall descent below 200 feet be performed unless landing minima are present.
- (3) That while section 91.116(b) clearly states that a landing may not be made unless the visibility is at or above the landing minimum required, nevertheless,

in the interests of safety and in order to insure proper interpretation, all conditions requiring a missed approach should be contained in section 91.117(b). Accordingly, an additional condition should be added to section 91.117(b) to the effect that if landing minima cannot be maintained, a missed approach must be executed.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOHN H. REED
Chairman

/s/ OSCAR M. LAUREL
Member

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

January 14, 1970

APPENDIX A

Crew Information

Allen Romady Tennyson, aged 50, had been employed by the G. A. Robinson Land Company, Memphis, Tennessee, since December 1968. He held Air Transport Pilot Certificate No. 1378427 with the following ratings: Douglas DC-3, commercial privileges, airplane single-engine land. He passed a Federal Aviation Administration first-class medical examination on April 17, 1968, with no limitations. His total flying hours as of April 17, 1968, were 15,300, with 170 hours flown in the previous 6 months. He had flown approximately 1,600 hours in a Douglas DC-3 type aircraft and received his DC-3 type rating on May 24, 1967. Except for one takeoff and one landing on March 19, 1969, no evidence was found that he had flown a DC-3 in any crew capacity since flying as a copilot approximately 1 year previous to the accident. Since December 1, 1968, when he began working for the G. A. Robinson Land Co., Tennyson had flown 140 hours in a Piper "Navajo." Forty-five hours were flown in March of 1969.

Marion Leo Hayes, aged 50, was employed by Avion, Inc., as a pilot. He held Air Transport Pilot Certificate No. 1497149 with the following ratings: Douglas DC-3, airplane single-engine land, airplane multiengine land, commercial privileges. He passed a Federal Aviation Administration first-class medical examination January 21, 1969, with the restriction that "Holder shall possess correcting glasses for near vision while exercising the privileges of his airman certificate." As of January 21, 1969, his total flying hours were approximately 6,000, with 200 hours flown during the previous 6 months. He received a type rating in a DC-3 on June 2, 1961, when he was a commercial pilot. The records reveal that he had flown over 2,000 hours as a pilot in the DC-3 and met the recent experience requirements of F.A.R. 61.47.

William Harvey Stovall, Jr., aged 26, worked for the Memphis School of Aeronautics, Memphis, Tennessee. He held Commercial Pilot Certificate No. 1750216 with the following ratings: airplane single-engine land, flight instructor (airplanes and instruments). He passed a Federal Aviation Administration first-class medical examination February 27, 1969, with no limitations. As of February 27, 1969, his record shows 900 total hours, with 250 hours flown during the previous 6 months. There is no record of his ever having flown as a pilot in a Douglas DC-3.

APPENDIX B

Aircraft Information

The following is general information of aircraft N142D from January 1, 1968, through March 19, 1969.

Owner: Avion Airways, Inc., Houston, Texas
Aircraft: Model.....Douglas DC-3
Serial Number1946
N Number.....N142D
Operations Certificate No. SW-35(c)
Certificate Effective Date: 1/23/67
Expiration Date: 1/23/70

N142D was removed from Avion Airways, Inc., Operating Certificate on March 19, 1969, per request of Avion Airways, Inc., to the Federal Aviation Administration. The FAA approval was dated March 19, 1969.

On March 19, 1969, N142D was leased to Mr. William Jackson of Travel Associates, Memphis, Tennessee. Appearing on the lease agreement (a partially burned copy was found in the wreckage) are the words, "Mr. Bill Jackson or and West Tenn...." The document was signed by Mr. John Hammett of Avion, Inc., and Bill Jackson.

The last operation of the aircraft by Avion Airways, Inc., according to the log book was a 40-minute ferry flight on March 19, 1969.

Aircraft Time Since Overhaul (TSO).....7584:40

The time of 7584:40 is a prorated time. The aircraft was purchased from Ozark Air Lines and the TSO on the aircraft at that time, according to Ozark, was 9883:10. On March 13, 1969, Avion Airways, Inc., in accordance with FAA AC-121-1, Chapter 4, dated December 15, 1962, titled, "Proration," corrected the aircraft TSO to 7584:40 to conform to their operation.

Next Annual Inspection	September 26, 1969
Next Operations Check	7667:20 hours
Next Service Check	7597:10 hours
Engines:	Pratt & Whitney 1830-92
Right Engine S/N	BP-464698
Time Since Overhaul	23:30
Total Time	2873:30 (Estimated)
Left Engine S/N	CP-356318
Time Since Overhaul	755:10 (Before Prorate: 765:52)
Total Time	Unknown

APPENDIX B

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Propellers :	Hamilton Standard 23E50-505
Right Propeller S/N	7024
Time Since Overhaul	2280:42 (Before Prorate: 3329:53)
Total Time	Unknown
Left Propeller S/N	126751
Time Since Overhaul	463:15
Total Time	Unknown

The maintenance records of N142D indicated that the aircraft was maintained in an airworthy condition in accordance with Avion Airways, Inc., Maintenance Manual and F.A.R. 121.709. There were no maintenance carry-over items and all discrepancies had been corrected and appropriate sign-offs were made by the mechanics and inspectors.

Weight and Balance

An accurate determination is not possible due to the lack of a load manifest and the demise in the accident of those responsible for the loading.

The following weight calculations are based on the operating weight as found in the Operations Manual for the aircraft, a ramp fuel weight of 3,600 pounds (600 gallons @ 6 pounds per gallon), an average passenger weight of 160 pounds, an average baggage weight of 50 pounds per person, and a fuel burnoff of 1,800 pounds for the flight from Memphis to New Orleans.

Operating Weight	19,154 pounds (2 pilots, 1 female flight attendant)
Subtracting Flight Attendant	- 130
Revised Operating Weight	<u>19,024</u>
Additional Pilot	160
24 Passengers	3,840
Baggage	1,200
Fuel	3,600
Ramp Weight	<u>27,824</u>
Taxi and Takeoff Fuel	- 270
Estimated Takeoff Weight	<u>27,554</u>
Burnoff Fuel	-1,800
Estimated Landing Weight	<u>25,754</u>
Maximum Allowable Gross Weight for Takeoff:	26,200 pounds (sea level)
Maximum Landing Weight:	25,346 pounds

APPENDIX C

Investigation

The Board received notification of the accident at approximately 8:30 a.m., e.d.t., on March 20, 1969, from the Federal Aviation Administration. An investigating team was immediately dispatched to the scene of the accident. Working groups were established for Operations, Air Traffic Control, Weather, Witnesses, Human Factors, Structures, Powerplants, Systems, and Maintenance Records. Parties to the investigation were from the Air Carrier, General Aviation, and Air Traffic Control functions of the Federal Aviation Administration. The on-scene investigation was completed March 25, 1969.

Hearing

No public hearing was held.

SEQUENTIAL

FRAMES

OF

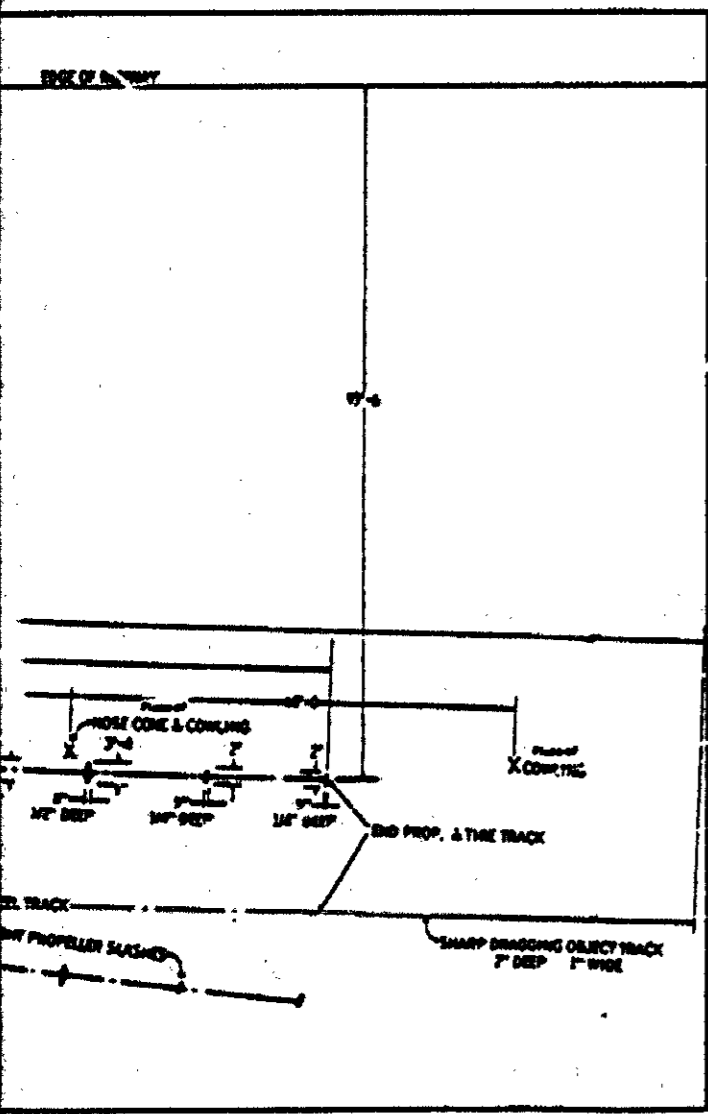
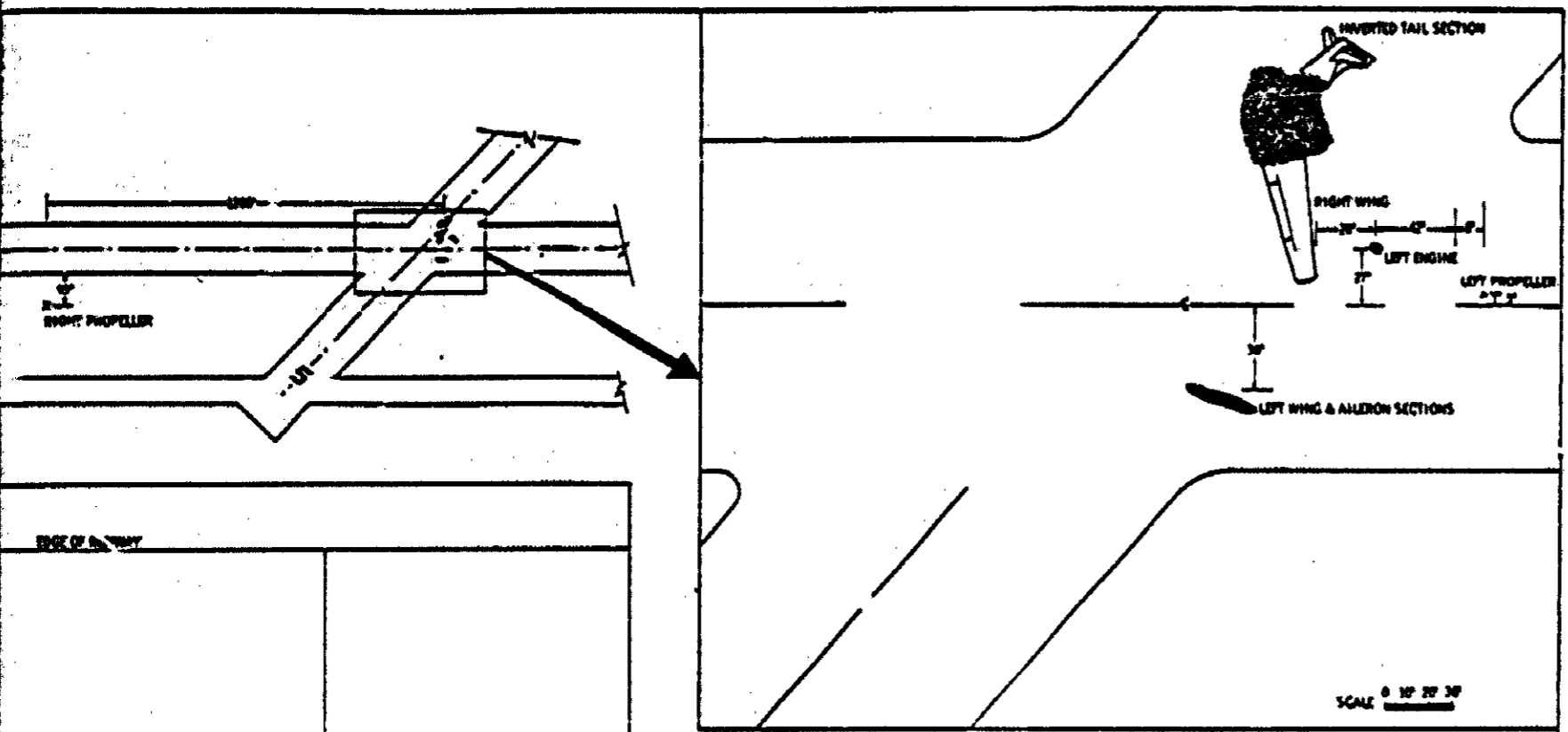
OVERSIZED

DOCUMENT

REQUIRES 2 FRAMES

PAGE # 37

A Thru B



ATTACHMENT NO. 1

NATIONAL TRANSPORTATION SAFETY BOARD
 DEPARTMENT OF TRANSPORTATION
 Washington, D.C. 20591

DCA 69A15 RUNWAY MARKINGS AND
 WRECKAGE DISTRIBUTION CHART
 AVION AIRWAYS, INC, DC3, N142D
 NEW ORLEANS INTERNATIONAL AIRPORT, LA.
 March 20, 1969

31B

MOISANT tower 119.9 122.7G 2781

ATIS 124.9

Apt. Elev. 3'

Var. 06°E

EA Apr 17

GS 333.8

Ground 121.9

127.2Cpl

MSA 2100

NEW ORLEANS Approach (R)

010°-189° 118.1

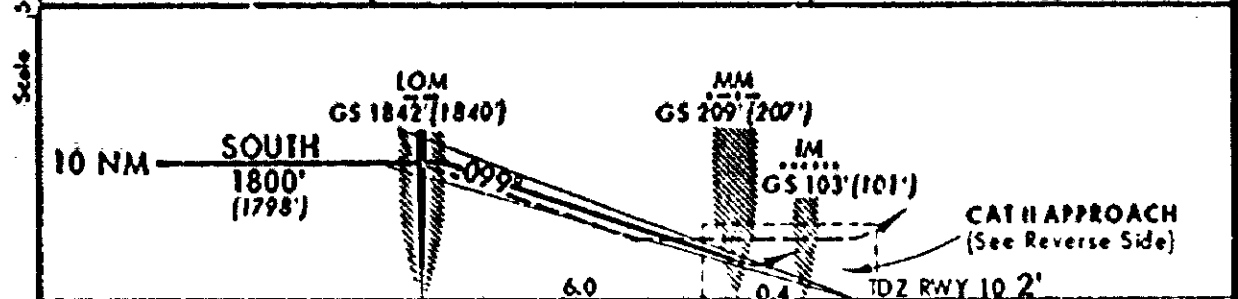
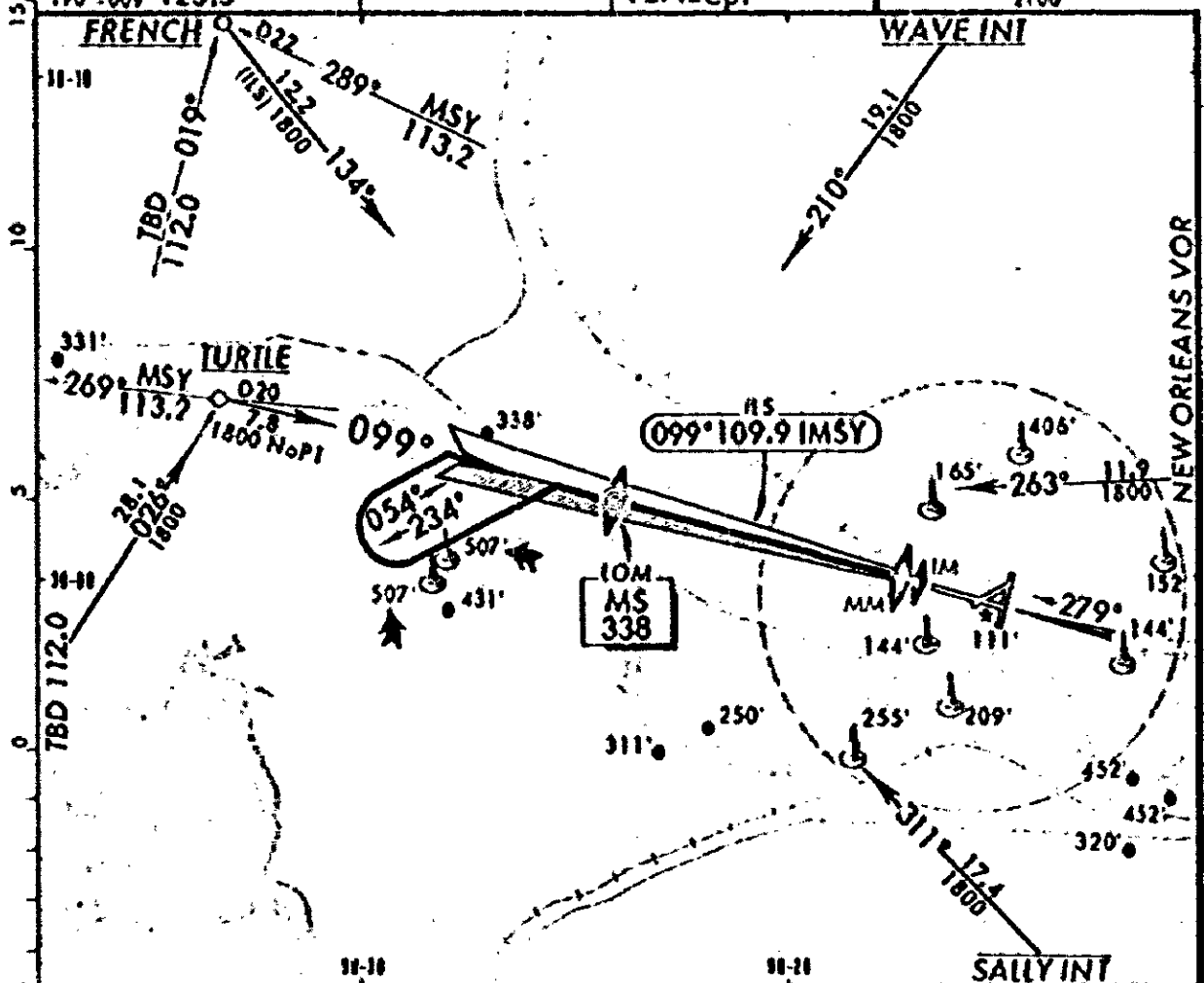
180°-009° 125.5

Departure (R)

120.6

Ground 121.9

127.2Cpl



PULL UP to 2000 feet on EAST crs ILS, or 099° from MS LOM within 15 NM, or as directed.

SPEED	STRAIGHT-IN LANDING RWY 10								CIRCLE-TO-LAND	
	ON 202' (200')	ON 252' (250')		MDA 360' (358')		MDA 400' (398')		MDA		
	FULLS	ML or ALS out	ML or ALS out	ML or ALS out	GS out	GS & ALS out	GS & ALS out	NDB (ADF) ALS out	ALS out	MDA
A	RVR 18 or 1/2	RVR 24 or 1/2	RVR 40 or 1/2	RVR 40 or 1/2	RVR 24 or 1/2	RVR 24 or 1/2	RVR 40 or 3/4	RVR 40 or 3/4	RVR 50 or 1	A 460' (457)-1
B	RVR 20 or 1/2	RVR 40 or 3/4	RVR 50 or 1	RVR 40 or 3/4	RVR 50 or 1	RVR 50 or 1	RVR 50 or 1	RVR 50 or 1	RVR 50 or 1	B 460' (457)-1 1/2
C	RVR 20 or 1/2	RVR 40 or 3/4	RVR 50 or 1	RVR 40 or 3/4	RVR 50 or 1	RVR 50 or 1	RVR 50 or 1	RVR 50 or 1	RVR 50 or 1	C 560' (557)-2
D	RVR 20 or 1/2	RVR 40 or 3/4	RVR 50 or 1	RVR 40 or 3/4	RVR 50 or 1	RVR 50 or 1	RVR 50 or 1	RVR 50 or 1	RVR 50 or 1	D 660' (657)-2
ALL	ON 352' (350')	ON 352' (350')		MDA 360' (358')		MDA 400' (398')		Non-Std 660' (657)-2		
ALL	RVR 40 or 3/4	RVR 50 or 1		RVR 50 or 1		RVR 50 or 1		RVR 50 or 1		
Ground speed - Kts	60	80	100	120	140	160	Air Carrier Jets: SFL or HIRL out - not less than RVR 40 or 3/4.			
G.S.	2' 30"	265	353	442	530	618	RVR 24 TDZ or CL out. RVR 1 mile HIRL also out.			
LOM to MAP 6.6	6.36	4.57	3.53	3.18	2.50	2.29	MDA 520' (518') when APP advises booms NW of apt. are in raised position. MDA 520' (517') when APP advises booms NW of apt. are in raised position.			

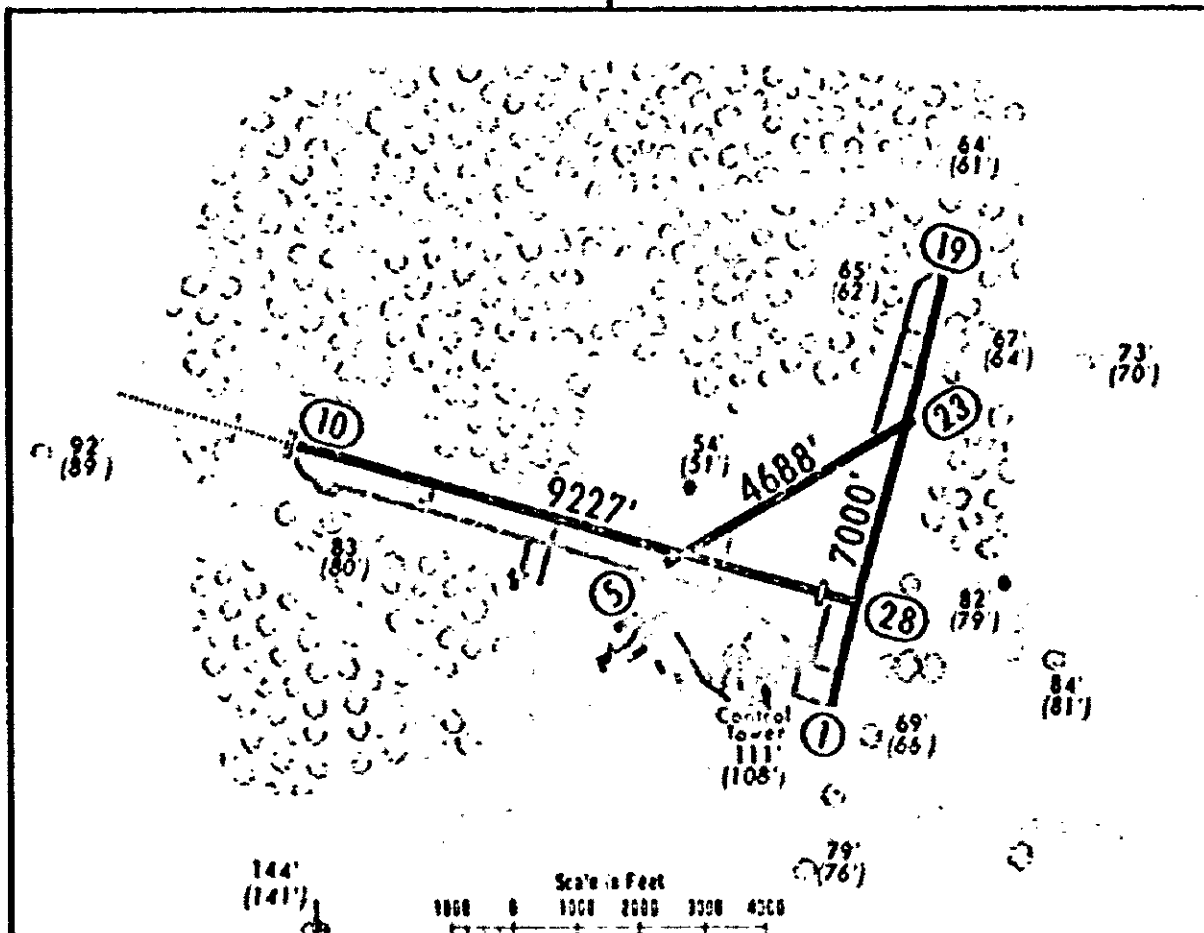
CHANGES: Minor.

NEW ORLEANS, LA.
NEW ORLEANS INT'L APT.
 Elev 3' 30" 00" N 90° 15' W

(11-1) APR 11 69

Jeppesen Approach Chart

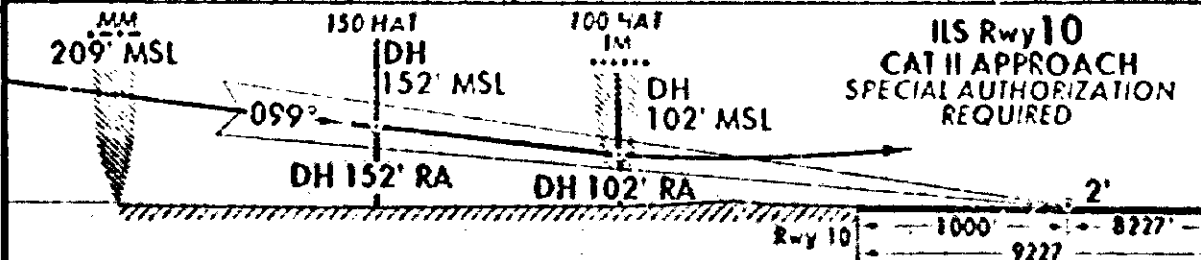
NOTE: Customs on prior request.



ADDITIONAL RUNWAY INFORMATION

RWY	LIGHTING	USEABLE LENGTHS			WIDTH
		LANDING BEYOND Threshold	Glide Slope	TAKE-OFF	
1	HIRE REIL				150'
19	HIRE				150'
5					150'
23					150'
10	HIRE CL HIALS (A) SFL IDZ	RVR	8227'	8507'	150'
28	HIRE CL	RVR	8507'	8507'	150'

9227' available with tower permission only.



CAT II MINIMA	150 HAT DAY & NIGHT		100 HAT NIGHT ONLY	
	RVR 16	DH 152' RA or 152' MSL	RVR 12	DH 102' RA or 102' MSL

PULL UP to 2000 feet on EAST course ILS within 15 NM, or as directed.

Eng to Other Eng to Eng to Eng	AIR CARRIER TAKE-OFF			ALTERNATE LANDING REQUIRED (CEILING) VISIBILITY	
	TAKE OFF ALTITUDE WITHIN 1.5 MIN. P. ON 30 M. T. - 1.5 MIN.	TAKE OFF ALTITUDE WITHIN 1.5 MIN. 2 ENG. 2 MIN. 35 ENG.	TAKE OFF ALTITUDE NOT FILED	ILS or PAR Approach	Other Approach
	SCHEDULED			ILS or PAR Approach	Other Approach
2 Eng to Other	RVR 18 or 1/2	RVR 50 or 1	RVR 50 or 1	603' (600') - 2	803' (800') - 2
2 Eng to Eng	RVR 16 or 1/4	RVR 50 or 1	RVR 50 or 1	603' (600') - 2	803' (800') - 2
1 Eng to Eng	RVR 16 or 1/4	RVR 50 or 1	RVR 50 or 1	703' (700') - 2	803' (800') - 2

RVR 24 Cl out. FAR Part 135 Operators. Rwy 10, RVR 18 A, B & C aircraft, RVR 20 D aircraft, Rwy 28, RVR 24.

CHANGES CAT II minima. © 1968 JEPPIEN & CO. DENVER COLO. U.S.A. ALL RIGHTS RESERVED

(1) Unless ground visibility at that airport is at least one statute mile; or

(2) If ground visibility is not reported at that airport, unless flight visibility during landing or takeoff is at least one statute mile.

§ 91.109 VFR cruising altitude or flight level.

Except while holding in a holding pattern of two minutes or less, or while turning, each person operating an aircraft under VFR in level cruising flight, at or above 3,000 feet above the surface, shall maintain the appropriate altitude prescribed below:

(a) When operating below 18,000 feet MSL and—

(1) On a magnetic course of zero degrees through 179 degrees, any odd thousand foot MSL altitude +500 feet (such as 3,500, 5,500, or 7,500); or

(2) On a magnetic course of 180 degrees through 359 degrees, any even thousand foot MSL altitude +500 feet (such as 4,500, 6,500, or 8,500).

(b) When operating above 18,000 feet MSL to flight level 290 (inclusive), and—

(1) On a magnetic course of zero degrees through 179 degrees, any odd flight level +500 feet (such as 195, 215, or 235); or

(2) On a magnetic course of 180 degrees through 359 degrees, any even flight level +500 feet (such as 185, 205, or 225).

(c) When operating above flight level 290 and—

(1) On a magnetic course of zero degrees through 179 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 300 (such as flight level 300, 340, or 380); or

(2) On a magnetic course of 180 degrees through 359 degrees, any flight level, at 4,000-foot intervals, beginning at and including flight level 320 (such as flight level 320, 360, or 400).

INSTRUMENT FLIGHT RULES

§ 91.115 ATC clearance and flight plan required.

No person may operate an aircraft in controlled airspace under IFR unless—

- (a) ~~He has filed an IFR flight plan, and~~
 (b) ~~He has received an appropriate ATC clearance.~~

§ 91.116 Takeoff and landing under IFR: general.

(a) *Instrument approaches to civil airports.* Unless otherwise authorized by the Administrator (including ATC), each person operating an aircraft shall, when an instrument letdown to an airport is necessary, use a standard instrument approach procedure prescribed for that airport in Part 97 of this chapter.

(b) *Landing minimums.* Unless otherwise authorized by the Administrator, no person operating an aircraft (except a military aircraft of the United States) may land that aircraft using a standard instrument approach procedure prescribed in Part 97 of this chapter unless the visibility is at or above the landing minimum prescribed in that Part for the procedure used. If the landing minimum in a standard instrument approach procedure prescribed in Part 97 is stated in terms of ceiling and visibility, the visibility minimum applies. However, the ceiling minimum shall be added to the field elevation and that value observed as the MDA or DH, as appropriate to the procedure being executed.

(c) *Civil airport takeoff minimums.* Unless otherwise authorized by the Administrator, no person operating an aircraft under Part 121, [123.] 129, or 135 of this chapter may take off from a civil airport under IFR unless weather conditions are at or above the weather minimums for IFR takeoff prescribed for that airport in Part 97 of this chapter. If takeoff minimums are not prescribed in Part 97 of this chapter, for a particular airport, the following minimums apply to takeoffs under IFR for aircraft operating under those parts:

(1) Aircraft having two engines or less: 1 statute mile visibility.

(2) Aircraft having more than two engines: $\frac{1}{2}$ statute mile visibility.

(d) *Military airports.* Unless otherwise prescribed by the Administrator, each person operating a civil aircraft under IFR into, or out of, a military airport shall comply with

the instrument approach procedures and the takeoff and landing minimums prescribed by the military authority having jurisdiction on that airport.

(e) *Comparable values of RVR and ground visibility.*

(1) If RVR minimums for takeoff or

landing are prescribed in an instrument approach procedure, but RVR is not reported for the runway of intended operation, the RVR minimum shall be converted to ground visibility in accordance with the table in subparagraph (2) of this paragraph and observed as the applicable visibility minimum for takeoff or landing on that runway.

[(2) RVR	<i>Visibility (statute miles).</i>
1600 feet	1/4 mile
2400 feet	1/2 mile
3200 feet	5/8 mile
4000 feet	3/4 mile
4500 feet	7/8 mile
5000 feet	1 mile
6000 feet	1 1/4 mile

[(1) Use of radar in instrument approach procedures. When radar is approved at certain locations for ATC purposes, it may be used not only for surveillance and precision radar approaches, as applicable, but also may be used in conjunction with instrument approach procedures predicated on other types of radio navigational aids. Radar vectors may be authorized to provide course guidance through the segments of an approach procedure to the final approach fix or position. Upon reaching the final approach fix or position, the pilot will either complete his instrument approach in accordance with the procedure approved for the facility, or will continue a surveillance or precision radar approach to a landing.

[(g) Use of low or medium frequency simultaneous radio ranges for ADF procedures. Low frequency or medium frequency simultaneous radio ranges may be used as an ADF instrument approach aid if an ADF procedure for the airport concerned is prescribed by the Administrator, or if an approach is conducted using the same courses and altitudes for the ADF approach as those specified in the approved range procedure.

[(h) Limitations on procedure turns. In the case of a radar initial approach to a final approach fix or position, or a timed approach from a holding fix, or where the procedure specifies "NOPT" or "FINAL", no pilot may make a procedure turn unless, when he receives his final approach clearance, he so advises ATC.]

[§ 91.117 Limitations on use of instrument approach procedures (other than Category II).

[(a) General. Unless otherwise authorized by the Administrator, each person operating an aircraft using an instrument approach pro-

cedure prescribed in Part 97 of this chapter shall comply with the requirements of this section. This section does not apply to the use of Category II approach procedures.

[(b) Descent below MDA or DH. No person may operate an aircraft below the prescribed minimum descent altitude or continue an approach below the decision height unless—

[(1) The aircraft is in a position from which a normal approach to the runway of intended landing can be made; and

[(2) The approach threshold of that runway, or approach lights or other markings identifiable with the approach end of that runway, are clearly visible to the pilot.

[If, upon arrival at the missed approach point or decision height, or at any time thereafter, any of the above requirements are not met, the pilot shall immediately execute the appropriate missed approach procedure.

[(c) Inoperative or unusable components and visual aids. The basic ground components of an ILS are the localizer, glide slope, outer marker, and middle marker. The approach lights are visual aids normally associated with the ILS. In addition, if an ILS approach procedure in Part 97 of this chapter prescribes a visibility minimum of 1800 feet or 2000 feet RVR, high intensity runway lights, touchdown zone lights, centerline lighting and marking and RVR are aids associated with the ILS for those minimums. Compass locator or precision radar may be substituted for the outer or middle marker. Surveillance radar may be substituted for the outer marker. Unless otherwise specified by the Administrator, if a ground component, visual aid, or RVR is inoperative, or unusable, or not utilized, the straight-in minimums prescribed in any approach procedure in Part 97 are raised in accordance with the following tables. If the related airborne equipment for a ground component is inoperative or not utilized, the increased minimums applicable to the related ground component shall be used. If more than one component or aid is inoperative, or unusable, or not utilized, each minimum is raised to the highest minimum required by any one of the components or aids which is inoperative, or unusable, or not utilized.

[(1) ILS and PAR.]

Component or aid	Increase decision height	Increase visibility (statute miles)	Approach category
LOC ¹ -----	ILS approach not authorized.	-----	All.
GS -----	As specified in the procedure.	-----	All.
OM, ¹ MM ¹ -----	50 feet -----	None -----	ABC.
OM, ¹ MM ¹ -----	50 feet -----	¼ -----	D.
ALS -----	50 feet -----	¼ -----	All.
SALS -----	50 feet -----	¼ -----	ABC.

¹ Not applicable to PAR.

[(2) ILS with visibility minimum of 1,800 or 2,000 feet RVR.]

Component or aid	Increase decision height	Increase visibility (statute miles)	Approach category
LOC -----	ILS approach not authorized.	-----	All.
GS -----	As specified in the procedure.	-----	All.
OM, MM -----	50 feet -----	To ½ mile -----	ABC.
OM, MM -----	50 feet -----	To ¾ mile -----	D.
ALS -----	50 feet -----	To ¾ mile -----	All.
HIRL, TDZL, RCLS. RCLS -----	None -----	To ½ mile -----	All.
RCLS -----	As specified in the procedure.	-----	All.
RVR -----	None -----	To ½ mile -----	All.

[(3) VOR, LOC, LDA, and ASR.]

Component or aid	Increase MDA	Increase visibility (statute miles)	Approach category
ALS, SALS -----	None -----	½ mile -----	ABC.
HIRL, MALS, REILS. -----	None -----	¼ mile -----	ABC.

[(4) NDB(ADF) and LFR.]

Component or aid	Increase MDA	Increase visibility (statute miles)	Approach category
ALS -----	None -----	¼ mile -----	ABC.]

§ 91.119 Minimum altitudes for IFR operations.

(a) Except when necessary for takeoff or landing, or unless otherwise authorized by the Administrator, no person may operate an aircraft under IFR below—

(1) The applicable minimum altitudes prescribed in Parts 95 and 97 of this chapter; or

(2) If no applicable minimum altitude is prescribed in those Parts—

(i) In the case of operations over an area designated as a mountainous area in Part 95, an altitude of 2,000 feet above the highest obstacle within a horizontal distance of five statute miles from the course to be flown; or

(ii) In any other case, an altitude of 1,000 feet above the highest obstacle within a horizontal distance of five statute miles from the course to be flown.

However, if both a MEA and a MOCA are prescribed for a particular route or route segment, a person may operate an aircraft below the MEA down to, but not below, the MOCA, when within 25 statute miles of the VOR concerned (based on the pilot's reasonable estimate of that distance).

(b) *Olimb.* Climb to a higher minimum IFR altitude shall begin immediately after passing the point beyond which that minimum altitude applies, except that, when ground obstructions intervene, the point beyond which the higher minimum altitude applies shall be crossed at or above the applicable MCA.

§ 91.121 IFR cruising altitude or flight level.

(a) *In controlled airspace.* Each person operating an aircraft under IFR in level cruising flight in controlled airspace shall maintain the altitude or flight level assigned that aircraft by ATC. However, if the ATC clearance assigns "VFR conditions-on-top," he shall maintain an altitude or flight level as prescribed by § 91.109.

(b) *In uncontrolled airspace.* Except while holding in a holding pattern of two minutes or less, or while turning, each person operating an aircraft under IFR in level cruising flight, in uncontrolled airspace, shall maintain an appropriate altitude as follows: