NATIONAL TRANSPORTATION SAFETY BOARD

AIRCRAFT ACCIDENT REPORT

Aero Taxi
Beech E18S, N42A
Cleveland, Ohio
June 22, 1972

NATIONAL TRANSPORTATION SAFETY BOARD
Washington, D. C. 20591
REPORT NUMBER: NTSB-AAR-72-33 c.1

File No. 3-0675

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Adopted: December 20, 1972

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TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No. NTSB-AAR-72-33	2. Government Accession No.	3. Recipient's Catalog NO.
4. Title and Subtitle Aero Taxi Beech E18S, N42A Cleveland, Ohio June 22, 1972 — Aircraft Accident Report -		5. Report Date December 20, 1972
		6. Performing Organization Code
7. Author(s)		8. Performing Organization Report No.
9. performing Organization Name and Address National Transportation Safety Board Bureau of Aviation Safety Washington, D. C. 20591		10. Work Unit No.
		11. Contract or Grant No.
		13. Type of Report and Period Covered Aircraft Accident Report June 22, 1972
12. Sponsoring Agency Name and Address **NATIONAL TRANSPORTATION SAFETY BOARD Washington, D. C. 20591**		14. Sponsoring Agency Code

15. Supplementary Notes

This report contains Aircraft Safety Recommendations A-72-113 through 114.

16. Abstract

Aero Taxi, Flight 407, a Beech Aircraft, Model E18S, N42A, an air taxi revenue cargo flight, crashed into a residential area at approximately 0840 eastern daylight time, June 22, 1972. The accident occurred shortly after takeoff from Cleveland-Hopkins International Airport, Cleveland, Ohio. The pilot, the only occupant of the aircraft, was fatally injured. Two houses were damaged by aircraft impact end fire, but no injuries were sustained by persons on the ground.

The National Transportation Safety Board determines that the probable cause of this accident was the in-flight failure of the left wing which resulted from a preexisting fatigue crack in the left-Wing lower spar cap at Wing Station 81. The fatigue crack was present during inspections of the spar cap for cracks at Wing Station 81 conducted prior to the accident, but it was not detected during these inspections.

17. Key Words	18. Distribution Statement
Wingspar failure in-flight Airframe failure in-flight Fatigue crack	Released to Public Unlimited Distribution

19. Security Classification (of this report)	20. Security Classification (of this page)	21. No. of Pages	22. Price
UNCLASSIFIED	**UNCLASSIFIED**	21	

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File No. 3-0675

NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D. C. 20591
AIRCRAFT ACCIDENT REPORT

Adopted: December 20, 1972

AERO TAXI
BEECH E18S, N42A
CLEVELAND, OHIO
JUNE 22, 1972

SYNOPSIS

Aero Taxi, Flight 407, a Beech Aircraft, Model E18S, N42A, an air taxi revenue cargo flight, crashed into a residential area at approximately 0840 eastern daylight time, June 22, 1972. The accident occurred shortly after takeoff on an Instrument Flight Rules flight plan from Runway 5R, Cleveland-Hopkins International Airport, Cleveland, Ohio. The accident site was located approximately 2.3 statute miles from the departure end of the runway. The pilot, the only occupant of the aircraft, was fatally injured. Two houses were damaged by aircraft impact and fire. There were no injuries to persons on the ground.

The investigation disclosed that a fatigue crack in the lower spar cap at Wing Station 81 precipitated an in-flight failure of the left wing.

The National Transportation Safety Board determines that the probable cause of this accident was the in-flight failure of the left wing which resulted from a preexisting fatigue crack in the left-wing lower spar cap at Wing Station 81. The fatigue crack was present during inspections of the spar cap for cracks at Wing Station 81 conducted prior to the accident, but it was not detected during these inspections.

As a result of this accident, the Safety Board made three recommendations to the Federal Aviation Administration.

INVESTIGATION

A Beech Aircraft, Model E18S, N42A, operating as Aero Taxi (Quaker City) Flight 407, departed from Philadelphia International Airport, Philadelphia, Pennsylvania, on an IFR 1/ flight plan at 0524 e.d.t. 2/ to Rockford, Illinois. Quaker City 407 had a planned en route fuel stop at Cleveland-Hopkins International Airport (CLE), Cleveland, Ohio. The flight landed at Cleveland-Hopkins International Airport at 0758 without incident.

Quaker City 407 departed from CLE at approximately 0837 for Rockford, Illinois. The aircraft made a normal takeoff, and shortly thereafter it entered a low overcast while within the airport boundaries. At 0838:48, after three requests, Quaker City 407 acknowledged the Cleveland Tower Local Controller's instructions to contact Cleveland Radar Departure Control and subsequently established radio communications with that facility. At 0839:07, Quaker City 407 acknowledgeddeparture control instructions to "... squawk zero four one one ident and you are in radar contact, turn left two eight zero." The acknowledgment to these instructions was the last communication from the aircraft.

The witnesses in the impact area were in general agreement that when the aircraft was first observed, it was in an uncontrolled dive to the ground, with one wing either broken or folded upward. They stated that they did not observe any fire, smoke, or separation of parts prior to ground impact.

The aircraft impacted the ground between two houses located in a residential area of Cleveland, 2.3 statute miles from the departure end of Runway 5R, in line with the centerline of the runway. The aircraft was in an approximate 80° nose-down attitude and was on a magnetic heading of approximately 085° at ground impact.

The wreckage was confined to an area about 100 feet in length and 50 feet in width. The entire aircraft was fragmented and consumed by ground fire, with the exception of both outboard wing panels between Wing Station (WS) 141 and the wingtip, both ailerons, and the right vertical fin and rudder.

There was no in-flight fire or explosion. Examination of both engines showed no preimpact failure or malfunction. The landing gear and flap assemblies were fully retracted. Examination of the aircraft wreckage and the associated impact damage to the two houses showed that the left wing was displaced upward between 70° and 80° at the time of initial impact. The right wing was attached and in place at impact.

The on-scene investigation of the left wing disclosed a fracture in the elliptical lower cap of the spar at WS81. A crack, approximately three-quarters of an inch in length, was found in the lower spar cap of the right wing at WS81.

1/ Instrument Flight Rules
2/ All times are eastern daylight, based on the 24-hour clock.

Metallurgical examination of portions of left- and right-wing lower spar caps disclosed the following:

1. The fracture of the left-wing lower spar cap at WS81 was caused by a fatigue crack which originated at the toe of a gusset plate weld on the outboard side of the landing gear slide tube cluster. The fatigue crack had propagated through approximately 65 percent of the cross sectional area prior to the final failure of the spar cap.

2. Small fatigue cracks were found in the left-wing lower spar cap, around the toe of the weld at WS73. The maximum depth of these cracks was approximately 0.03-inch.

3. The crack found in the right-wing lower spar cap at the toe of the weld at WS81 was a fatigue crack 0.80-inch in length.

The wing structure of this aircraft had been inspected by visual, magnetic particle and X-ray examination in compliance with existing airworthiness directives 3/ on the following dates: September 29, 1964; October 28, 1965; September 16, 1966; May 9, 1967; August 29, 1968; January 3, 1969; July 28, 1970; and August 9, 1971.

All of these inspections were accomplished within the specified 500-hour flight time intervals. This accident occurred approximately 300 hours flight time after the last inspection on August 9, 1971.

3/ This accident was one of a series of fatal accidents involving in-flight wing structural fatigue failures of Beechcraft Model 18 aircraft. A wing fatigue failure was first identified by a National Bureau of Standards metallurgical examination in 1947. Beginning in 1948, a number of Beechcraft Service Bulletins and Federal Aviation Administration Airworthiness Directives and Amendments thereto were published, outlining various combinations of visual, magnetic particle, or X-ray procedures developed to detect the presence of wingspar cracks. In general, the airworthiness directives required that several wing stations be inspected in accordance with the referenced Beechcraft Service Bulletins on this series aircraft, which had accumulated 1,500 or more total flight-hours. Thereafter these inspections were to be conducted at intervals not to exceed 500 hours of flight time from the date of the last inspection. The wing stations required to be inspected included, among others, WS81 and WS73, the spar locations at which fatigue cracks were found.

The radiographs (X-ray plates) from the required wing inspections performed in 1966, 1967, 1969, and 1970 were examined subsequent to the accident by the Safety Board. Indications of cracks in the wingspar, including the crack at left WS81, were found during this examination on the 1969 and 1970 X-ray plates. It was noted, however, that even with the knowledge of the exact location of the cracks in the spar caps, detection of the crack indication on the X-ray plates was difficult, due to the faintness of the crack traces.

The X-ray inspection piates from the last inspection (August 7, 1971) conducted on N42A prior to the accident were on board the aircraft at the time of the crash and were partially destroyed by fire. Because of this damage, a valid examination of these plates could not be made. However, a written report showed that this inspection had been conducted in accordance with the prescribed airworthiness directives and that no crack indications had. been detected at WS81 and WS73.

ANALYSIS AND CONCWSIONS

Examination of the wing structure disclosed that the left wing was displaced upward approximately 80° at ground impact. Damage to the two houses also showed that the left wing was displaced at the time they were struck by the aircraft. This wing displacement confirmed witness statements that the left wing failed in flight. Metallurgical examination of the left-wing lower elliptical spar showed that the wing failure was caused by a fatigue fracture in the lower spar at WS81.

This was the fourth fatal. accident involving wing failure of this series aircraft since August 1966. All of these wing failures were caused by fatigue cracks in areas where inspections designed to detect cracks were required by airworthiness directives. The problem of detecting the fatigue cracks during these required inspections is clearly demonstrated in this case. Examination by the Safety Board of the X-ray plates taken during the 1969 and 1970 inspections of the lower spars disclosed crack indications at both right and left WS81, as well as left WS73. However, these crack indications were not detected by the personnel authorized to perform these inspections either through examination of the X-ray plates or by other means specified in the airworthiness directives for inspecting the spar. It follows that these cracks were present when the 1971 inspection was conducted, but again they were not detected. (The 1971 X-ray plates were so badly damaged in the crash that it was not possible to determine after the accident whether crack indications had been present in these plates.) Thus, the Safety Board's investigation indicated that, at least for the years 1969, 1970, and 1971, visual, magnetic particle, and X-ray inspections did not detect existing cracks in the lower wingspar caps. The postaccident metallurgical study and examination of the X-ray plates leaves little doubt that the fatigue crack at WS81 had. been in existence since 1969 and was sufficiently large at that time (approximately 0.9-inch in length) to have been detected through visual, magnetic particle, and X-ray inspection methods.

A similar example of this crack-detection problem was found in the wing failure accident prior to this one (April 28, 1967). It was noted that a fatigue failure occurred in an area that had been inspected in accordance with the prescribed airworthiness directive procedures approximately 46 flight hours before that wing failed in flight. Although the investigation of that accident confirmed that the wing failed as a result of a fatigue crack at WS81, no crack indications had been detected during the required inspections.

In view of the history of wing fatigue failures in this model aircraft, as well as the facts demonstrated in this case, the Safety Board concluded that the wingspar inspection procedures as prescribed and applied were not adequate to insure the detection of existing fatigue cracks. As a result, the aircraft was flown with cracks in the lower wingspars until one of these cracks became large enough to cause complete failure of the spar.

The Safety Board recognized this deficiency early in the investigation and forwarded recommendations to the Administrator stressing the importance of precision in the wingspar X-ray examination and specifying the need for additional instructions to clarify this procedure.

PROBABLE CAUSE

The National Transportation Safety Board determines that the probable cause of this accident was the in-flight failure of the left wing which resulted from a preexisting fatigue crack in the left-wing lower spar cap at Wing Station 81. The fatigue crack was present during inspections of the spar cap for cracks at Wing Station 81 conducted prior to the accident, but it was not detected during these inspections.

RECOMMENDATIONS

As a result of the investigation of this accident, the Safety Board on August 4, 1972, issued three recommendations (Nos. A-72-112 through 114) directed to the Federal Aviation Administrator. These recommendations were intended to ensure early detection of fatigue cracks in the wing structure. Copies of the recommendation letter and the Administrator's response thereto are included in Appendix C.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD:

/s/ JOHN H. REED
Chairman

/s/ FRANCIS H. McADAMS
Member

/s/ LOUIS M. THAYER
Member

/s/ ISABEL A. BURGESS
Member

/s/ WILLIAM R. HALEY
Member

December 20, 1972

APPENDIX A

CREW INFORMATION

Captain William Henry, aged 49, held Airline Transport Pilot Certificate No. 1369543 with ratings in the C-46 and Lockheed Constellation and commercial privileges in aircraft, single- and multiengine land, and the DC-3. He held a FAA first-class medical certificate on May 11, 1972, with the limitation that holder should wear correcting glasses while executing the privileges of the airman's certificate.

He had accumulated a total of 15,176 flight hours of which 1,361 were in make and model and 172 hours in make and model within the preceding 90 days. According to the FAA and the operator's records, he was certificated and currently qualified in compliance with the applicable Federal Aviation Regulations.

APPENDIX B

AIRCRAFT HISTORY

Beech Aircraft Model E18S, N42A, serial No. BA133, was manufactured in 1956 and had accumulated a total of 8,227 hours flight. The last annual inspection was accomplished ,on August 18, 1971, and the aircraft was flown approximately 300 hours after that date.

The aircraft had been maintained in accordance with the Federal Air Regulations.

The wing elliptical front spar lower cap had been inspected within the prescribed 500-hour flight time intervals on September 29, 1964; October 28, 1965; September 16, 1966; May 8, 1967; August 29, 1968; January 3, 1969; July 28, 1970; and August 9, 1971.

No cracks were detected during these inspections.

UNITED STATES OF AMERICA
NATIONAL TRANSPORTATION SAFETY BOARD
WASHINGTON, D.C.

ISSUED: August 4, 1972

Adopted by the NATIONAL TRANSPORTATION SAFETY BOARD
at its office in Washington, D. C.
on the 25th day of July 1972

FORWARDED TO:
Honorable John H. Shaffer
Administrator
Federal Aviation Administration
Washington, D. C. 20591

SAFETY RECOMMENDATIONS A-72-112 thru 114

The National Transportation Safety Board's investigation of a recent fatal accident involving a Beechcraft E18S, N42A, indicates that some changes in Airworthiness Directive 72-8-5 (Beech) may be required to reduce the possibility of similar accidents in the future.

The accident occurred shortly after takeoff from Hopkins International Airport, Cleveland, Ohio, on June 22, 1972, when N42A, being operated as a cargo flight, crashed into a residential area, killing the pilot. Two houses were damaged by the impact and fire, but there were no fatalities on the ground.

A fatigue failure occurred in the elliptical lower cap of the left wing spar at wing station 81. The fatigue crack that precipitated the failure originated at the toe of a gusset-plate weld on the outboard side of the landing-gear slide tube cluster. Aircraft records indicate that this area was inspected by X-ray and magnetic-particle methods, in compliance with AD 67-16-1, after 7,622 hours of service in July 1970 and after 7,927 hours of service in August 1971. No indications of a crack were noted during either of these inspections. The total time on the aircraft at the time of the accident was approximately 8,227 hours.

We examined the X-ray plates made in 1970 and by using laboratory methods, with knowledge of the point of the fatigue failure, we determined that there was an indication that a crack was present. The 1971 X-ray plates were aboard the aircraft at the time of the accident and were partly destroyed by fire. The portion of the plate containing the area of the fatigue failure was burned away.

Honorable John H. Shaffer (2)

As you know, this is one of a series of similar accidents involving Beechcraft models with tubular wing-spar construction. These accidents have been caused by fatigue failures originating at welds in the spar due to stress concentrations in areas where the resistance to crack initiation is low because of decarburization in the outside surfaces of the spar tubes. The cause was first determined by a National Bureau of Standards (NBS) investigation in 1947 and has been confirmed by subsequent investigations at NBS and in our own laboratory.

The Safety Board recognizes the efforts the Federal Aviation Administration has made to cope with this problem. Recommendations concerning action to be taken at this time are being submitted to you in an effort to help with a difficult and serious problem. The N42A accident occurred about 300 hours of service time after a presumably adequate inspection for cracks that included the area where the spar subsequently failed. Thus, the crack must have propagated to complete failure in 300 hours of service time from a size that was not detected by the inspection.

All of the fatigue failures in this type of Beechcraft spar that we are familiar with have started as small cracks along the edge of a weld bead. Such cracks are difficult to detect, either by X-ray or magnetic-particle inspection methods. X-ray techniques particularly must be carefully controlled with respect to alignment of the head of the X-ray machine and the density of the plate at the edges of the weld beads where there is a marked change in the thickness of metal penetrated by the X-ray beam.

Therefore, the National Transportation Safety Board recommends that the Federal Aviation Administration:

1. Modify the inspection instructions in Airworthiness Directive 72-8-5 (Beech) to include an emphasis of the importance of extremely close attention to the spar tube at the edges of weld beads, including instructions for centering of the X-ray head with respect to each area where inspection is required.

2. Require an early inspection, complying with the modified AD 72-8-5 instructions of all aircraft that have accumulated more than 200 hours since the last inspection.

3. Reduce the inspection interval in AD 72-8-5 from 500 hours to 200 hours as specified in your telegraphic Airworthiness Directive of May 1967.

Honorable John H. Shaffer (3)

These recommendations will be released to the public on the issue date shown above. No public dissemination of the contents of this document should be made prior to that date.

L. M. Thayer

By: L. M. Thayer
Acting Chairman

DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

WASHINGTON, D.C. 20590

OFFICE OF
THE ADMINISTRATOR

8 AUG 1972

Honorable John H, Reed
Chairman, National Transportation Safety Board
Department of Transportation
Washington, D. C. 20591

Dear Mr. Chairman:

This replies to your Safety Recommendations A-72-112 through 114 issued 4 August 1972 as a result of your investigation of a fatal accident involving a Beechcraft E18S, N42A, which crashed on 22 June 1972 at Cleveland, Ohio.

We understand that indications of cracks in the lower spar tube at wing station 81 were found in the X-ray records of the accident aircraft for the 1969 nnd 1966 inspections as well as the 1970 inspection as you note. Because the crack was detectable in several inspectiom before final failure, we believe that primary emphasis should be placed on increasing the probability of detection during a given inspection rather than increasing inspection frequency. Towards this end, we are valuating possible methods of improving inspection effectiveness. We plan to revise Airworthiness Directive 72-8-5 upon completion of this evaluation including positive instructions for centering the X-ray head as you recommend.

As an interim measure, we have issued an airworthiness directive which will require an additioral inspection of the accident failure area (wing station 81) every 100 hourc by visual and either dye penetrant or magnetic particle procedures. Wing station 81 is considered the most critical both from the standpoint of the likelihood of cracking and the consequence of failure.

Sincerely,

J. H. Shaffer
Administrator

72-20-5 Beech. Amdt. 39-1526. Applies to all serial numbers of Models C18S, AT-11, C-45, C45A, UC-45B, UC-45F, AT-7, AT-7A, AT-7B, AT-7C, JRB-1, JRB-2, JRB-3, JRB-4, SNB-1, SNB-2, SNB-2C, D18S, D18C. C-45G, TC-45G, C-45H, TC-45H, TC-45J (SNB-5), JRB-6, E18S, E18S-9700, G18S, 3N, 3NM, 3TM, D18C-T, and RC-451 (SNB-5P), and H-18 airplanes with Serial Numbers BA-730 and below; and to aircraft of the above models subsequently redesignated under a Supplemental Type Certificate, except those modified under the Supplemental Type Certificates referenced by Paragraph F.

Compliance: Required as indicated, unless already accomplished.

To prevent possible wing failure, for airplanes with 1,500 or more total hours' time in service on the effective date of this AD or airplanes that subsequently accumulate 1,500 total hours' time in service after that date, in order to detect cracks in the elliptical front spar lower cap of the wing center section, except as indicated by Paragraph D, accomplish the following within the next 50 hours' time in service after the effective date of this AD (or 500 hours' time in service after the last complete AD 67-16-1/ 71-11-5 or AD 72-8-5 inspection, if applicable), and thereafter at intervals not to exceed 500 hours' time in service from the date of the date of the last inspection: (These inspections may be performed at one time or may be staggered, provided that no given area exceeds 500 hours' time in service between inspections.)

A) Modify the lower wing skin in accordance with Figure (1) or Figure (2) or an FAA-approved equivalent to facilitate the inspections specified in Paragraph B.

B. (1) Inspect the front spar lower cap of the wing center section on each side of the airplane by methods specified below, except inspection sites reinforced by Beech Aircraft Corporation Kits 18-4024, 791 or 792 need not be inspected:

Wing Station	*Site (See Figure 3)*	*Method (See Para. C)*
90	Tips of welds at clevis tangs, upper and lower surfaces of cap	Visual, x-ray and either magnetic particle or penetrant
81, 73, 64 & 57	Tips of welds at gussets, upper surface of cap	" " "
46	Outboard ends of splice in cap, upper and lower surface of cap	" " "
32	Tips of welds at wing splice plate, fore and aft surfaces of cap	" " "
45 to 43	Tip of weld around cluster upper surface of cap	Visual and either magnetic particle or penetrant
61	Lower surface of spar cap below tube cluster, as seen from wheel well	" " "

(2) Temporarily move clamps and other equipment as necessary to eliminate interference with the above inspections. Removal of spar cap finish is not necessary.

(3) Flex the wing when specified by Paragraphs C and D by applying and relieving a 75 to 100 pound upward force at or near the wing tip on the (left or right) side being inspected. This may be done by hand.

(4) Load the wing on the side being inspected when specified by Paragraph C by applying a 75 to 100 pound upward force at the junction of wing rib number 10 and the front spar. Place material such as lumber under and along the number 10 rib so as to distribute the force.

C. (1) Accomplish visual inspection before and after cleaning, and while the wing is being flexed. Use a flashlight or other illumination and a low power magnifying device.

(2) When the magnetic particle method is chosen, conduct the inspection while the wing is either flexed or loaded. Conduct the inspection before magnetism is induced and again while magnetism across the inspection site is induced by a Magnaflux Corp. Model Y-5 or YM-5 yoke or when any equivalent is used in accordance with the manufacturer's instructions.

(3) When the penetrant method is chosen, perform the inspection while the wing is being flexed. Use either dye or fluorescent materials in accordance with the penetrant manufacturer's instructions.

(4) For each site where x-ray inspection is specified by Paragraph B, accomplish x-ray inspection while the wing is loaded. Figure 4 is an aid to the following instruction. Place fine grain film (such as GAF 800, DuPont NDT-65 or Kodak AA) sandwiched between lead screens of 0.005-inch thickness on the upper surface of the spar cap (over an inspection site) with identification symbols for at least the site (e.g. LWS 81 etc.), date, and airplane registration number. Secure a steel penetrameter of 0.005-inch thickness to the lower surface of the spar cap at a location clear of the inspection site. Position the x-ray source approximately 36 inches from and generally below the film so that the center of the x-ray beam will be perpendicular to the major axis of the elliptical spar cap and perpendicular to the spanwise centerline of the spar cap at each inspection site. Use a flashlight and a protractor level as necessary to see that aiming of the x-ray beam compensates for wing dihedral and nose up attitude. At those areas covered by aluminum skin, a locally fabricated jig may be used to position the x-ray source. Expose film so that density of the radiograph of the spar cap material near the inspection site is 1.5 to 2.8 on the densitometer or National Bureau of Standards density scale. View film to see that the inspection site, the 0.010 inch diameter hole in the penetrameter, and its entire outline are plainly shown. Using a low power magnifying device, examine the inspection site portion of each radiograph for faint indications of cracks in spar cap material transverse to the spanwise centerline.

NOTE: Fourteen radiographs are normally adequate for one complete inspection.

D) Until inspection at w.s. 81 as specified in Paragraphs B(1) and C is accomplished, special inspection at w.s. 81 is necessary within 25 hours' time in service after August 4, 1972, and thereafter at intervals not to exceed 100 hours' time in service. Visual and either magnetic particle or penetrant methods must be used while the wing is simultaneously flexed. Inspection at w.s. 81 per AD 72-8-5 may be substituted for any (except the first) inspection required by this Paragraph. This special inspection may be discontinued after inspection at w.s. 81 is accomplished per Paragraph B(1).

E. If a crack is found as a result of any inspection required by this AD, prior to further flight, repair or replace the affected part in accordance with Beech Aircraft Corporation SAR 59-705 (for w.s. 80), 81 Kits 791 (for w.s. 32), 792 (for w.s. 81 and 73), and 18-4024 (for w.s. 57, 64, 73, and 81) or any equivalent approved by

the Chief, Engineering and Manufacturing Branch, FAA, Central Region.

F. An airplane is exempt from requirements of this AD if it is altered so as to incorporate STC SA1192WE, SA1533WE, SA832SW, SA2000WE or SA643CE, or any other STC which specifically exempts affected airplanes from compliance with this AD.

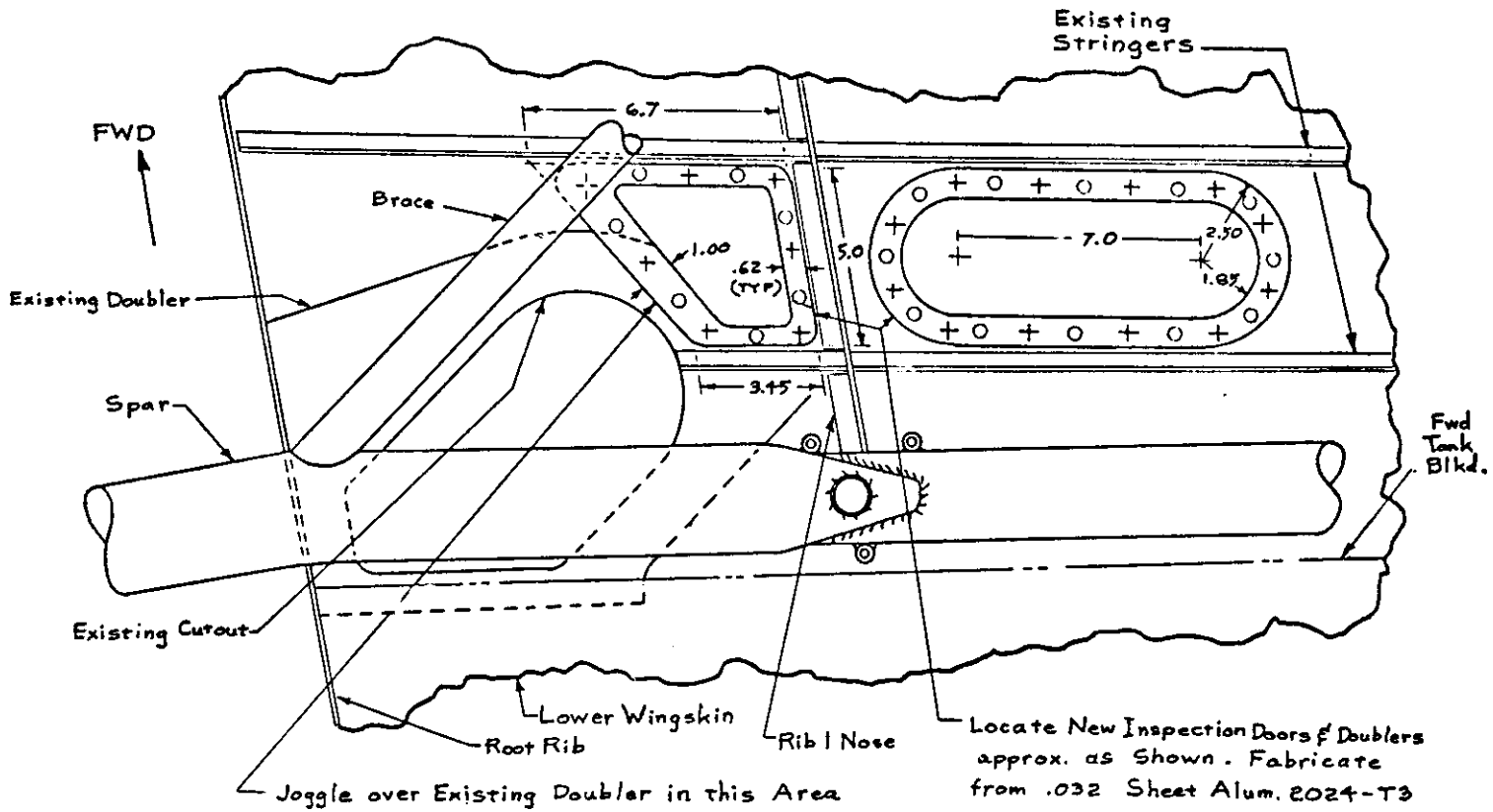
G. Written notification must be sent to the Chief, Engineering and Manufacturing Branch, FAA, Central Region, stating the location and length of any cracks discovered during inspections required by this AD, and the total operating time of the airplane at the time of the discovery. In addition, for airplanes not previously inspected per AD 67-16-1 or AD 72-8-5 results of the initial inspection must be reported as above, even if no cracks are discovered. (Reporting approved by the Bureau of the Budget under No. 04-R0174.)

Currently effective Beech Aircraft Corporation's Service Bulletins 64-15, 64-16, 64-17 and 66-10 and MIL-STD-453 consider this subject, but this AD takes precedence in any conflicting detail.

NOTE: Part (b) of AD 64-21-1 and Part (b) of AD 64-21-3 requiring inspection of other portions of the center section and AD 67-8-2 requiring inspection of outer wing panels remain in effect for only some of the airplanes affected by this AD.

This AD supersedes AD 72-8-5 (Amendment 39-1432) and AD 72-16-1 (Amendment 39-1493).

This amendment becomes effective September 29, 1972.



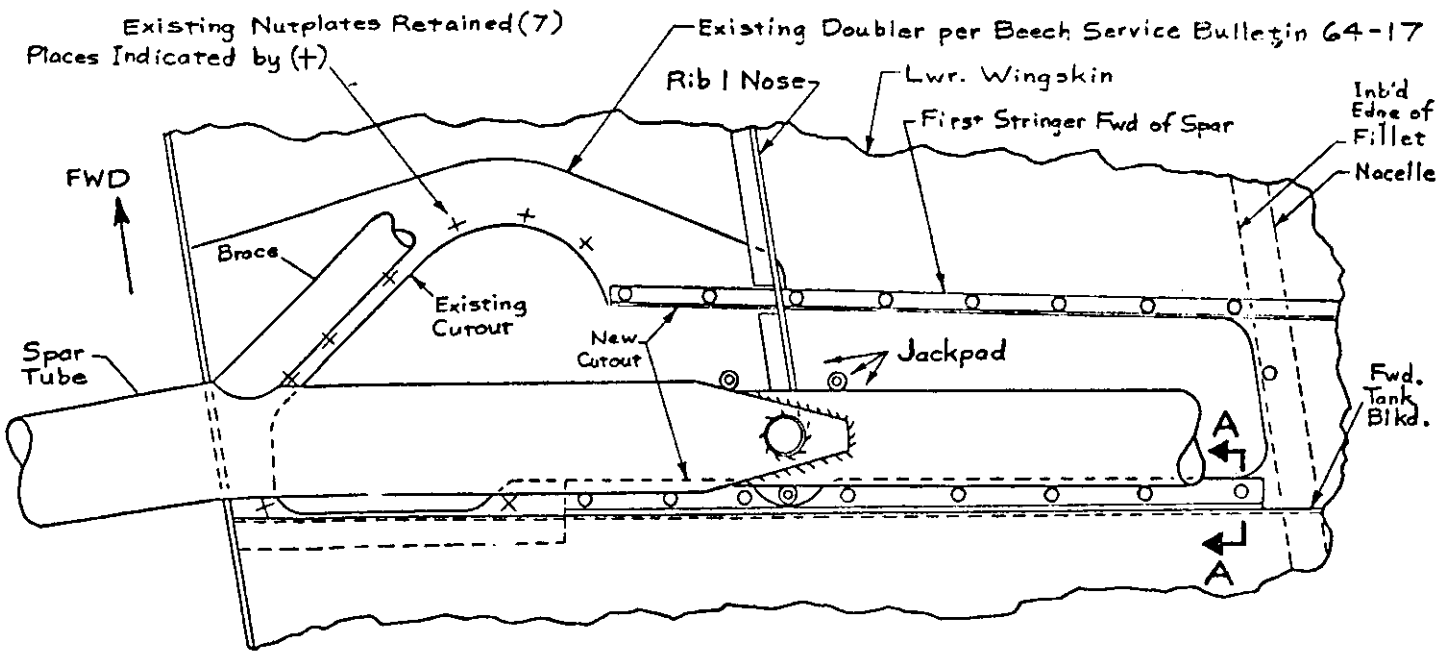
OPERATIONS:

Drill #10 ($\frac{.200}{.199}$) hole thru new doors, wingskin & doublers as shown by (O) 19 places (approx. 24" spaces).
Attach (19) nutplates to doublers with countersunk AD3 rivets. (MK1000-3 Nutplates Recommended).
Attach doublers to skin with AD4 rivets shown by (+) 19 places (approx. 2.4" spaces).
Install doors on lower side with #10 screws 19 places.

R.H. WING SHOWN - VIEW LOOKING DOWN ON LOWER WINGSKIN & SPAR
L.H. Opposite
(Upper Wingskin Omitted for Clarity)

FIGURE 1

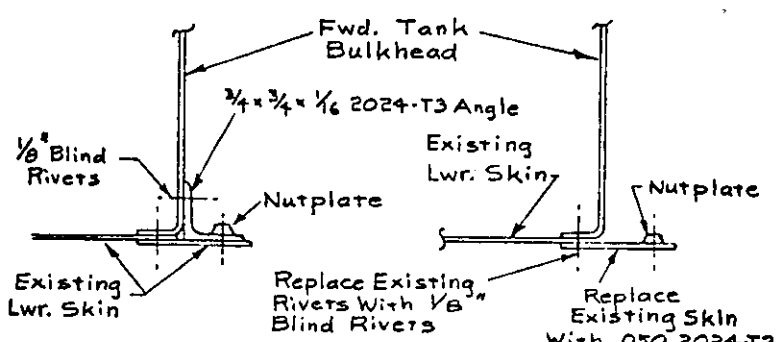
(AD 72-20-5)



VIEW LOOKING DOWN ON LOWER WINGSKIN AND SPAR TUBE

by Bob Grober

Attach MK1000-3 Nutplates (or equiv.) (17 places) as shown by (O). Cut inspection door from .032 2024-T3 Alum. Allow 1/2" edge margin around all screws (min). Install door on lower side with #10 screws (25 places): cut three holes for jackpad access. Inspection door not shown.

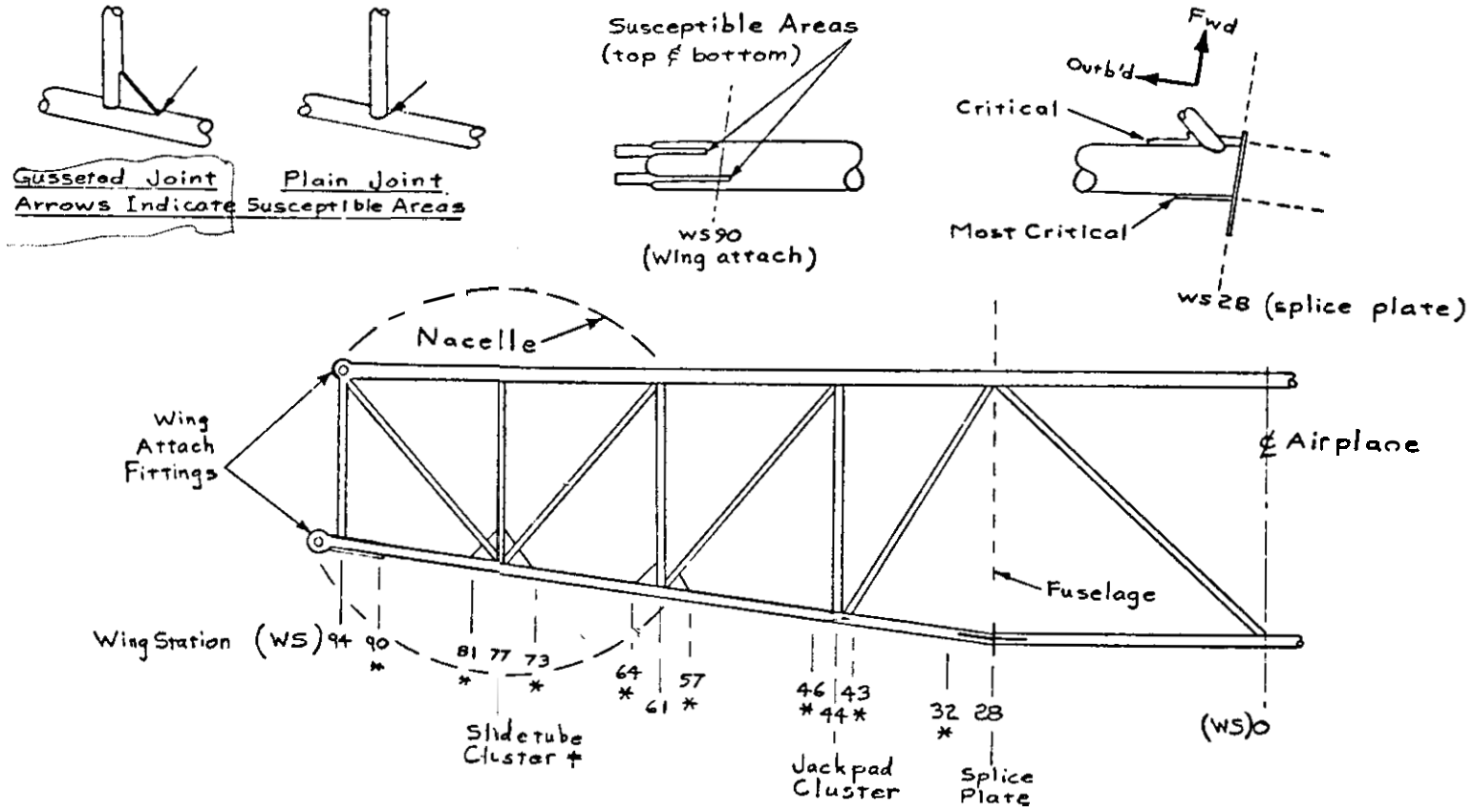


VIEW A-A VIEW A-A

OPTIMAL MEANS OF ATTACHING INSPECTION PLATE AFT EDGE

FIGURE 2

(AD 72-20-5)



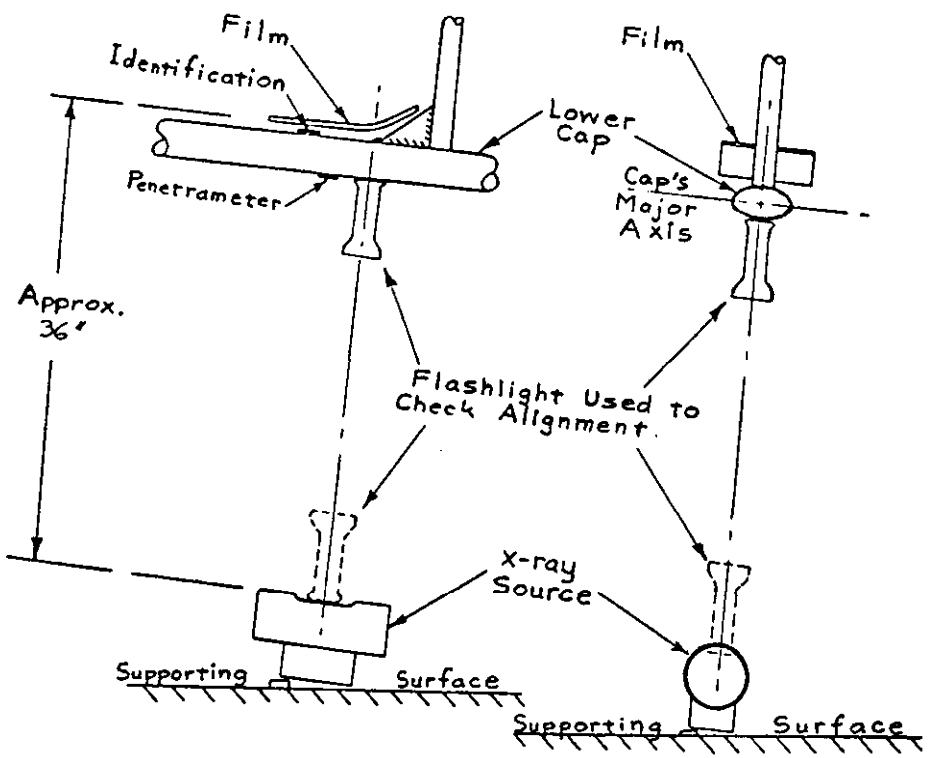
Half of Main Spar Center Section Truss

* INDICATES AREAS TO BE INSPECTED PER THIS A.D.

† SEE AD 64-21-1, part (b) and AD 64-21-3, part (b).

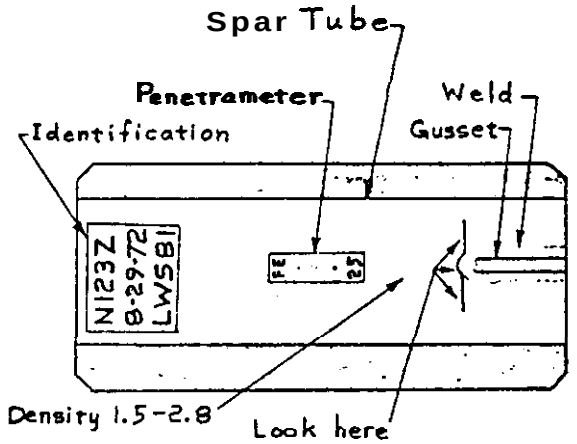
FIGURE 3

(AD 72-20-5)

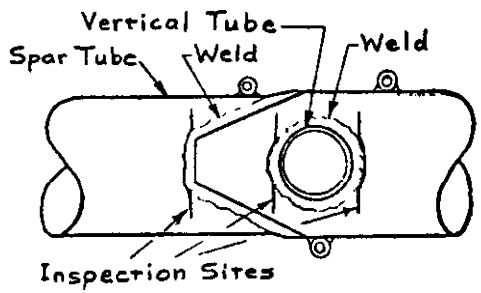


FRONT VIEW
SHOWING SETUP FOR DIHEDRAL - TYPICAL GUSSETED JOINT

SIDE VIEW
SHOWING SETUP FOR NOSE-UP ATTITUDE



EXAMPLE of RADIOGRAPH
TYPICAL CRACK SHOWN
GUSSETED JOINT



JACKPAD & SPLICE

FIGURE 4

(AD 72-20-5)