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TO: HOLDERS OF ALL SA226/227 SERIES AIRPLANES

This is **partial** revision the **SA226 and SA227 Supplemental Inspection Document (SID), Revision F**, Issued: September 27, 1999.

Revised: May 01, 2012

1. REASON

To revise Section III, page 2 to correct initial and repeat inspection compliance for Supplemental Inspection No. 52-31-01.

2. INSTRUCTIONS

A. This Document has been **partially** reprinted. Remove and discard Title Page and pages ii thru vi, Section III, pages 1 and 2, and replace with those of Revision F.

B. Place this revision transmittal sheet directly behind the Title Sheet of this Document.

3. PREVIOUS REVISIONS

Revision A, February 6, 2003

Revision B, March 20, 2003

Revision C, May 10, 2006

Revision D, June 30, 2008

Revision E, March 31, 2009

CURRENT DESIGN ACTIVITY CAGE CODE 8G4X8



Engineering and Manufacturing, Inc.
Creedmoor, North Carolina 27522

SA226/227 SERIES

SA226: AT, TC, T, T(B) AIRPLANES

SA227: AT, AC, BC, TT, TT(300),
CC, DC AIRPLANES

CURRENT DESIGN ACTIVITY CAGE CODE 8G4X8



Engineering and Manufacturing, Inc.
Creedmoor, North Carolina 27522



M7 AEROSPACE, LP Supplemental Inspection Document (PN: 27-10054-213)

INITIAL ISSUE

SEPTEMBER 27, 1999

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REVISION F

MAY 01, 2012

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SA226 & SA227 SERIES
 SUPPLEMENTAL INSPECTION DOCUMENT
Revision Log

Revision Level	Description	DATE
IR	Initial Release	Sept 27,1999
A	Correct serial numbers Sec III p4 Clarify inspection method Sec IV, p9, p12 Revise Table of Contents	Feb. 6, 2003
B	Correct serial numbers Sec II p1 Clarify inspection Sec IV page 10, 11 Update address pxi Reformat notes 1 and 2 pxiii Update address p xiv Correct SID number Sec II p 2 Corrected serial numbers Sec IV p 7	March 20, 2003
C	Correct airplane Series call out Sec IV p8 FIGURE 1, from SA227 to SA226 Added Page number, to Refer to Figure 1, in Sec IV page 9, PREPARATION, now reads, Refer to Figure 1, Page 13 Added Page number, to Refer to Figure 1, in Sec IV Page 12, PREPARATION, now reads, Refer to Figure 1, Page 8	May 10, 2006
D	Revised Title Page Revised Record of Revisions Revised Table of Contents Added Serial Numbers for CC and DC aircraft on APPLICABILITY page v. Made editorial changes to text throughout INTRODUCTION section denoted by change bars starting on page vi and continuing to page xiv. Added CC7-27-011 Service Bulletin and corrected contact information in Sec I, pg 1. Added Page number to Sec I, pg 2. Correct serial numbers Sec II, p1 Added Page number to Sec II, pg 4. Made editorial changes to text throughout SECTION III denoted by change bars starting on page 1 and continuing to page 11. Added Page number to Sec III, pg 12. Made editorial changes to text throughout SECTION IV denoted by change bars starting on page 1 and continuing to page 22.	June 30, 2008

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Revision Log

Revision Level	Description	DATE
E	Revised Title Page Added new page (iii) to Revision Log. Added "Intentionally Left Blank" Page (iv) to Revision Log. Revised Record of Revisions page. Now page v. Revised Table of Contents page. Now page vi. Revised Serial Numbers for CC / DC aircraft on APPLICABILITY page. Now page vii. INTRODUCTION section now on pages viii thru xv. Sample Discrepancy Report now on page xvi. Sec I, pg 1, contact information moved to page 2. Sec II, pg 1, Revised CC / DC serial numbers. Revised Title of SID No. 57-10-03. Sec II, pg 3, added Initial and Repeat inspections for 57-10-03. Sec III, pg 1, Revised CC / DC serial numbers. Sec III, pg 6, Revised CC / DC serial numbers. Revised Initial inspection to 14,300 hours. Sec III, pg 8, Revised CC / DC serial numbers.	March 31, 2009
F	Revised Title Page Revised Revision Log, page iii. Revised Record of Revisions, page v. Sec III, pg 2, revised Initial and Repeat inspections for 52-31-01.	May 01, 2012

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Revision Log

**Revision
Level**

Description

DATE

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**SA226 / SA227 SERIES AIRCRAFT
SUPPLEMENTAL INSPECTION DOCUMENT
RECORD OF TEMPORARY REVISIONS**

T.R. NO.	SECTION/ PAGE NO.	DATE ISSUED	DATE INSERTED	BY	DATE REMOVED	BY	INCORP INTO REV NO.
TR-001	Appendix C, Pg 9 of 14.	FEB 10/15	FEB 10/15	M7	MAY 18/15	M7	TR-002
TR-002	Appendix C, Pg 9 of 14.	MAY 18/15					

TEMPORARY REVISIONS

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APPLICABILITY

MODEL	YEAR	CERTIFIED	SERIAL NOS.
SA226-T	1970		201-248
SA226-T(A)	1974		249-291
SA226-T(B)	1978		276, 292-417
SA226-AT	1970		001-074
SA226-TC	1970		201-396, 398-413, 418, 419
SA227-TT	1981		421-541
SA227-TT(300)	1984		447, 465, 471, 483, 512, 518, 521, 527, 529, 536
SA227-AT	1981		421B, 423-631, 695
SA227-AC	1981		406, 415, 416, 420-788
SA227-BC	1989		762, 764, 766, 770-789
SA227-CC / DC	1990		784, 790-904

THE SA226/SA226 SERIES SUPPLEMENTAL INSPECTION DOCUMENT IS VALID FOR SA226 AND SA227 AIRCRAFT WITH LESS THAN 50,000 FLIGHT HOURS.

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INTRODUCTION

1.0 DISCUSSION

1.1 Introduction

The Supplemental Structural Inspection Program for Fairchild SA226/SA227 aircraft is based on current aircraft usage, material and airframe tests, and damage tolerance analysis. A practical inspection program has been established for each Principal Structural Element (PSE), where

A PSE is a structural element whose failure, if it remains undetected, could lead to loss of the aircraft. Selection of a PSE is influenced by the susceptibility of a structural area, part, or element to fatigue, corrosion, stress corrosion, or accidental damage.

The inspection program consists of supplemental inspections as required for continued airworthiness of the aircraft as they age. The existing inspection program is considered adequate for detecting corrosion and accidental damage. The emphasis of the Supplemental Structural Inspection Program is to detect fatigue damage whose probability increases with time.

The Supplemental Structural Inspection Program was sponsored by the FAA and developed through the combined efforts of Fairchild, and Metro/Merlin/Expediter operators. This program is valid for SA226 and SA227 aircraft with less than 50,000 flight hours. Structural testing results during SID development determined the vertical crack growth was well in excess of 50,000 flight hours. Based on those results, the vertical tail requires no additional inspections or modifications to achieve 50,000 flight hours.

1.2 History

The Fairchild SA226/SA227 series aircraft (the "Metro", "Merlin", and "Expediter") were produced from 1970 to 2000. During those 30 years, approximately 900 aircraft entered service and the design underwent extensive development to increase its economic usefulness. The maximum takeoff weight grew from 12,500 lbs to 16,500 lbs. Many aircraft in the fleet have exceeded 30,000 flight hours of operation. The original design goal for the aircraft was an economic life of 35,000 hours. It is expected that the present program will support continued safe operation to 50,000 hours.

The SA226 and SA227 are twin turboprop aircraft that can be configured for cargo, executive or 19-seat commuter operation. Structurally there is little difference between the SA226 and SA227. The primary difference is that the SA227 wing span is longer by 10 feet and strengthened to support higher takeoff weights. Both models have a constant circular cross-section fuselage, which is 33 inches in radius and can be pressurized to 7 psi.

1.3 Objective

The objective of the Supplemental Structural Inspection Program is the detection of damage due to fatigue, overload, or corrosion, through the practical use of Non-Destructive Inspection (NDI) methods. The Supplemental Inspection Document (SID) addresses primary and secondary airframe components only. Powerplant, electrical items, and primary and secondary systems are not addressed by this document.

To establish the basis for those items included, the following assumptions have been made.

- A. The aircraft has been maintained in accordance with Fairchild / M7 Aerospace recommendations or equivalent.
- B. Where the SID is directed to a specific part or component, it is implied that the inspection will include observation and evaluation of the surrounding area of parts and equipment. Any discrepancies found during this inspection outside the scope of the SID should be reported to M7 Aerospace through the existing condition reporting system, so that changes can be made to the SID where necessary.

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- C. Aircraft modified by Supplemental Type Certificate (STC) are not the responsibility of M7 Aerospace. Any inspections called for in Fairchild/M7 Aerospace manuals or the SID that have areas that have been modified by STC shall automatically be referred to the STC holder by the owner and/or maintenance organization for obtaining FAA approval guidelines.

2.0 PRINCIPAL STRUCTURAL ELEMENTS

2.1 Rationale Used to Select Principal Structural Elements

An aircraft component is classified as a Principal Structural Element (PSE) if the component contributes significantly to carrying flight and ground loads, and if failure of the component could result in catastrophic failure of the airframe.

2.2 Selection Criteria

The factors used to determine the PSEs in this document include the following.

A. SERVICE EXPERIENCE

A review of Service Bulletins and FAA Service Difficulty Reports compiled over the history of the airplane has pointed to known structural problem areas. Where component life is unacceptably short without modification of the structure, service bulletins have been required.

B. STRESS ANALYSIS

Extensive finite element modeling of the wing and certain other components was carried out in support of certification. The accuracy of the models has been checked by full-scale static testing, providing confidence in the use of results for locations other than strain gage locations.

C. STRAIN SURVEYS

Several strain surveys – both in flight and on the ground – have provided stress data at important locations throughout the airframe. Much of this data was correlated to analytical results from finite element models.

D. FATIGUE TESTING

A complete SA226 airframe was fatigue tested in 1980 under realistic flight and pressurization loads. Cracks that developed were monitored for growth throughout the duration of the test. Many of the problem areas have since been updated with more fatigue-resistant designs via service bulletins and production design changes. At the conclusion of the test several fail-safe cuts were inflicted on the structure and limit load was applied to all the major components. In addition loads up to 91% of ultimate were applied to the wing structure.

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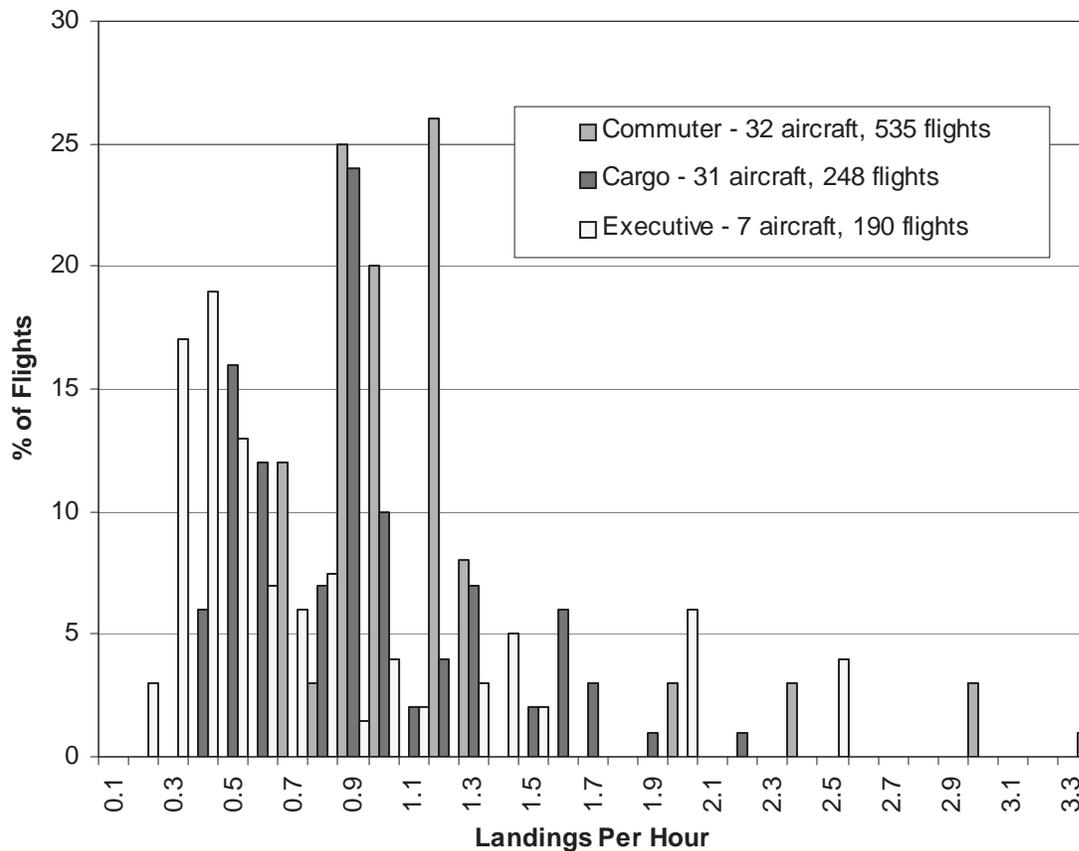
3.0 DURABILITY – FATIGUE AND DAMAGE TOLERANCE

3.1 Aircraft Usage

Aircraft usage data for the SID program was based on a sampling of the in-service utilization of the aircraft. These data were used in combination with load exceedance tables to develop representative fatigue loads spectra. Operational data for development of the Supplemental Inspection Program was obtained from a survey covering a total of 70 aircraft and 871 flights during 1996-97. The breakdown of the flights is as follows:

- Two commuter operators: 535 flights with 32 aircraft
- One cargo operator: 248 flights with 31 aircraft
- One executive operator: 190 flights with 7 aircraft

Additional information was gathered from the Official Airline Guide and teleconferences with operators. A graphical summary of the usage data from the survey is shown in Figure 1.



Flight Length Summary
Figure 1

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3.2 Stress Spectrum

A fatigue loads spectrum, in terms of gross area stress and based on the usage flight profiles, was developed for each PSE to be analyzed. The spectrum represents all significant loads, including those arising from taxi, thrust, flight (gust and maneuver), and landing impact. The resulting spectrum is a representative flight-by-flight, cycle-by-cycle random loading sequence that reflects the appropriate and significant airplane response characteristics.

After reviewing the aircraft usage data and the way in which the surveyed aircraft were flown, four sets of stress spectra were developed – one for the SA226, and one for each of the three SA227 flight profiles – as described in Section 3.3.

3.3 Description of Flight Spectrum

The SA226 flight profile consists of one 30-minute flight. After takeoff at 11,800 lbs, the aircraft climbs to altitude at 160 knots. Cruise is at 20,000 feet and 250 knots, after which the aircraft descends at 220 knots and lands weighing 11,000 lbs. This profile represents the severest commuter operation for the SA226, flown early in their lifetimes. Many of these planes were later converted to cargo configuration with lower utilization rates and less severe flight profiles.

There are three SA227 profiles: Commuter (one 30 minute flight), Cargo (one 60 minute flight), and Executive (one 120 minute flight). Each flight has a climb speed of 160 knots, cruise speed of 250 knots, and descent speed of 220 knots. However, the cargo flight naturally has the highest takeoff and landing weights whereas the longer executive flight reaches highest altitudes.

The stress spectrum used for PSEs present on only the SA227 was based on a composite SA227 flight profile. The composite profile consists of one commuter flight, three cargo flights, and one executive flight. This yields a total of five flights spanning 5.5 hours. The stress spectrum used for PSEs present on both the SA226 and SA227 aircraft was based on the more severe SA226 commuter profile.

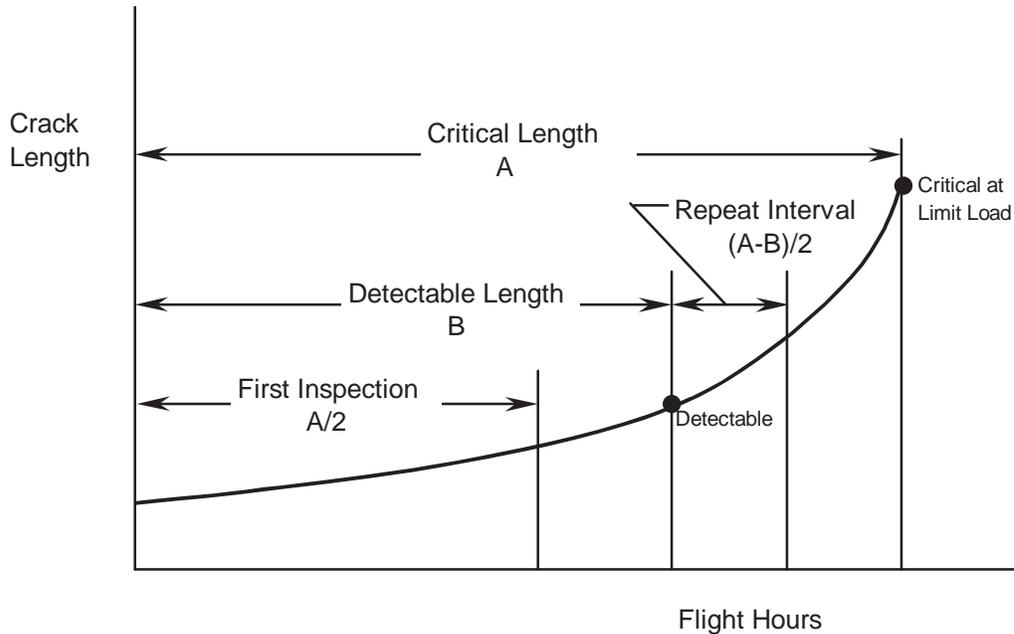
3.4 Damage Tolerance and Fatigue Assessments

The damage tolerance and fatigue assessments provide the basis for establishing inspection frequency requirements for each PSE. The evaluation includes a determination of the probable location and modes of damage and has been based on analytical results, available test data, and service experience. The evaluation includes application of appropriate scatter factors to fatigue test data as well as the determination of crack growth rates and residual strength. Linear elastic fracture mechanics has been used to perform the majority of the damage tolerance analysis.

In the evaluation, particular attention is paid to potential structural problem areas associated with aging aircraft. Examples include (a) large areas of structure working at the same stress level, which could cause widespread fatigue damage; (b) a number of small, undetectable, and adjacent cracks capable of suddenly joining into a long crack (e.g. a line of rivet holes); (c) redistribution of load from adjacent failing or failed parts causing accelerated damage to alternate load paths (i.e. the “domino effect”); and (d) concurrent failure of multiple load path structure (e.g. crack arrest structure).

Initial inspections were based on the shorter of analytical crack growth curves, fatigue test results, or service experience. Where analytical crack growth was used, the initial inspection was set at $c_{crit}/2$, where c_{crit} is the crack size at which the structure can no longer support limit load. The initial crack size was assumed to be 0.05 inch in most cases. Figure 2 shows a typical crack growth curve and the inspection intervals determined therefrom.

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Typical Crack Growth Curve
Figure 2

4.0 REPORTING – COMMUNICATIONS

For the SID program to be successful at assuring continued airworthiness in the most economical manner, it is essential that a free flow of information exist between the operators, the FAA, and M7 Aerospace. Significant details of inspection results, repairs, and modifications accomplished must be communicated to Fairchild in order to assess the effectiveness of the recommended inspection procedures and inspection intervals.

Additionally, items not previously considered for inclusion in the SID may be uncovered through operator inspections and reporting. These items will be evaluated by M7 Aerospace and, if applicable to the aircraft configurations concerned, will be added to the SID for the benefit of all operators.

The reporting methods described in the following pages have been established within the Service Engineering department of M7 Aerospace to aid in this process. Further information can be obtained by contacting M7 Aerospace Service Engineering.

4.1 Discrepancy Reporting

Discrepancy reporting is essential to provide for adjustment of the inspection thresholds and repeat intervals as well as adding or deleting inspections. It may be possible to improve the inspection methods, repairs, and modifications involving PSEs based on the data reported.

All cracks, sheared fasteners, and significant corrosion found during inspections should be reported to M7 Aerospace within 10 days. The PSE inspection results are to be recorded and reported on a form as shown on the following pages.

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4.2 Discrepancy Form Disposition

Send all available data, including forms, repair data, photographs, sketches, etc to:

M7 Aerospace, LP
Service Engineering
P.O. Box 790490
San Antonio, TX 78279-0490
FAX (210) 820-8609

NOTE: This system does not supersede the normal channels of communication for items not covered by the SID

4.3 M7 Aerospace Follow-up Action

All SID reports will be reviewed by M7 Aerospace Engineering to determine if any of the following actions should be taken:

- Check the effect on structural or operational integrity
- Check other high-time aircraft to determine whether a service bulletin should be issued
- Determine whether reinforcement is required
- Revise the SID if required

5.0 INSPECTION METHODS

A very important part of the SID program is selecting and evaluating state-of-the-art nondestructive inspection (NDI) methods applicable to each PSE, and determining a minimum detectable cracks length, c_{det} , for each NDI method. The minimum detectable crack length is used in conjunction with the critical crack length, c_{crit} , to define the life interval for the crack to grow from c_{det} to c_{crit} . This interval, $(c_{crit} - c_{det})/2$, is used to define the repeat inspection frequency for the SID program's required inspections. The threshold inspection generally occurs at $c_{crit}/2$. For a given NDI method and PSE, c_{det} corresponds to a crack size with 90% probability of detection. An example of repeat and initial inspection interval determination is shown in Figure 2.

Potential NDI methods were selected and evaluated on the basis of crack orientation, location, c_{crit} , part thickness, and accessibility. Inspection reliability depends on the size of the inspection task, human factors (such as qualifications and alertness of inspector), equipment reliability, and physical access. Visual, radiographic, liquid penetrant, eddy current, and magnetic particle methods were considered. A description of each of these methods is presented in Section IV – Inspection Methods and Requirements. Additional information on NDI methods can be found in the Structural Repair Manual for your aircraft.

6.0 RELATED DOCUMENTS

6.1 Existing Inspections, Modifications, and Repair Documents

M7 Aerospace has published a number of documents that are useful to maintaining the airworthiness of aircraft:

- SA226, SA227 & Commuter Category Maintenance Manuals
- SA226, SA227 & Commuter Category Illustrated Parts Catalogs
- SA226, SA227 & Commuter Category Service Information (Service Bulletins, Service Letters, and Service Notes)
- SA226, SA227 & Commuter Category Structural Repair Manuals
- SA226, SA227 & Commuter Category Airframe Airworthiness Limitations Manuals

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For information or to obtain these documents, contact:

M7 Aerospace, LP
Spares Department
P.O. Box 790490
San Antonio, TX 78279-0490
PH (800) 577-7273
(210) 820-8657

6.2 Service Letters/Bulletins Affected by SID

As an aid to operators, a listing of Service Bulletins pertaining to the SID is given in Section I – Technical Document Reference. For information concerning the technical data included in these Service Bulletins that apply to your aircraft, Contact M7 Aerospace Service Engineering. A comprehensive list of all technical publications, including service letters and bulletins, applicable to each airplane model is also available. This information can be obtained by contacting Spares at (800) 577-7273 or (210) 820-8652.

7.0 APPLICABILITY/LIMITATIONS

This SID manual is applicable to all SA226 and SA227 aircraft with less than 50,000 flight hours. Serial numbers originally certified include those listed previously in the Applicability section of this manual.

8.0 PSE DETAILS

This section contains the significant details selected by the rationale process described in paragraph 2.0 These items are considered significant to maintain continued airworthiness of the Fairchild SA226 and SA227 series aircraft. Service Bulletins pertaining to the PSEs are listed in Section I – Technical Document Reference.

A summary of the PSEs is presented in Section II – Listing of Supplemental Inspections. This can be used as a checklist by operators. A summary of inspections by flight hours or flight cycles is also given.

8.1 PSE Data Sheets

A data sheet for each PSE is provided in Section III – Supplemental Inspection Documents. Each data sheet contains the following information:

- Supplemental Inspection Number
- Title
- Effectivity
- Inspection Compliance
- Initial Inspection Interval
- Repeat Inspection Interval
- Purpose
- Inspection Instructions
- Access/Location
- Detectable Crack Size
- Inspection Procedure
- Repair/Modification
- Comments

NOTE 1: Listing of a Detectable Crack Size does not imply that cracks are allowed. No unrepaired cracks are allowed. Damaged parts must be repaired or replaced.

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NOTE 2: **Accomplishment of the SID inspections does not in any way replace preflight inspections, good maintenance practices, or maintenance and inspections specified in other documents.**

8.2 Repair Information/Modifications

Modifications and repairs may be made in accordance with approved Fairchild / M7 Aerospace manuals, service bulletins, or other approved documents. Repairs not covered by an existing approved document may be coordinated with the assistance of M7 Aerospace Service Engineering at FAX (210) 820-8609.

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SECTION I – TECHNICAL DOCUMENT REFERENCE

MAINTENANCE/REPAIR MANUALS

Aircraft	Number	Title
SA226	27-10054-047	Maintenance Manual
SA227	27-10054-095	Maintenance Manual
SA227 Commuter Category	27-10054-133	Maintenance Manual
SA226/SA227	27-10054-079	Structural Repair Manual
SA227 Commuter Category	27-10054-127	Structural Repair Manual

To obtain a Maintenance/Repair Manual, contact:

M7 Aerospace, LP
 Spares Department
 P.O. Box 790490
 San Antonio, TX 78279-0490
 (800) 577-7273
 (210) 820-8657

SERVICE BULLETINS

Number	Title	Date	Reference SID No.
226-27-061	Control Column Pivot Improvement	06-16-97	27-31-01
227-27-042	Control Column Pivot Improvement	06-16-97	27-31-01
CC7-27-011	Control Column Pivot Improvement	06-16-97	27-31-01
226-55-011	Horizontal Stabilizer Beef-up	06-00-99	55-10-01
227-55-007	Horizontal Stabilizer Beef-up	06-00-99	55-10-01
227-71-008	Inspection/Modification of Upper Truss	02-07-97	71-21-01
CC7-71-001	Inspection/Modification of Upper Truss	02-07-97	71-21-01

FIELD MAINTENANCE PROCEDURES

FMP-57-011	Eddy Current Inspection Proc., BL 9	06-09-96	57-10-03
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Section III assumes that the following Service Bulletins have been accomplished. The intent of each of these Service Bulletins was required by FAA Airworthiness Directive.

226-53-007	Cargo Door Belt Frames
227-53-003	Cargo Door Belt Frames
226-55-010	Horizontal Stabilizer
227-55-006	Horizontal Stabilizer
226-32-065	MLG/NLG Yoke
227-32-039	MLG/NLG Yoke
CC7-32-007	MLG/NLG Yoke

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To obtain a Service Bulletin listed above, contact:

M7 Aerospace, LP
Spares Department
P.O. Box 790490
San Antonio, TX 78279-0490
PH (800) 577-7273
PH (210) 820-8652

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SECTION II – LIST OF SUPPLEMENTAL INSPECTION DOCUMENTS

SID No.	Title	Date	Effectivity	Initial	Repeat
27-31-01	SA226/SA227 Control Column Roller Bearing	Aug 31/99	SA226 – All SA227 – All, CC / DC - 784, 790-904	1,000 Hrs	N/A
52-31-01	SA226/SA227 Cargo Door Hinge	Aug 31/99	SA226 – All SA227 – All	37,500 Cycles	1,000 Cycles
55-10-01	SA226/SA227 Rib Strap at Horizontal Stabilizer Rear Spar at BL 3.1	Aug 31/99	SA226 – All SA227 – Up to S/N 786	35,000 Hrs	N/A
57-10-01	SA226 Wing Main Spar Lower Cap at Station 99	Aug 31/99	SA226 – All Except TC398 & up T(B) 303E & up AT 423 & up	24,750 Hrs	2,750 Hrs
57-10-02	SA226 Wing Main Spar Lower Cap at Station 9	Aug 31/99	Note 1	14,300 Hrs	10,000 Hrs
57-10-03	SA226/227 Wing Main Spar Lower Cap at Station 9	Aug 31/99	Note 1	14,300 Hrs	10,000 Hrs
57-10-04	SA226 Wing Rear Spar Lower Cap at Station 27	Aug 31/99	SA226 – All	16,500 Hrs	2,000 Hrs
57-10-05	SA227 Wing Main Spar Lower Cap at Station 99	Aug 31/99	SA227 – All	20,000 Hrs	5,000 Hrs
57-10-06	SA226/SA227 Lower Wing Skin Splice at Station 27	Aug 31/99	SA226 – All SA227 – Up to S/N 591	11,800 Hrs	5,500 Hrs
57-10-07	SA226/SA227 Wing Lower Center Section Skin at Landing Light Cutout	Aug 31/99	SA226 – All SA227 – TT - All	11,000 Hrs	2,500 Hrs
71-21-01	SA227 Engine Mount at Firewall	Aug 31/99	Note 1	1,000 Hrs	N/A

NOTE 1: Refer to the inspection document in section III for effectivity.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
 SUPPLEMENTAL INSPECTION DOCUMENT
SUMMARY OF INSPECTIONS BY FLIGHT HOURS - SA226
Initial Inspections

Initial Inspection	Effectivity	SID Numbers
1,000 Hrs	All	27-31-01
11,000 Hrs	All	57-10-07
11,800 Hrs	All	57-10-06
20,000 Hrs	All	57-10-05
35,000 Hrs	All	55-10-01
37,500 Cycles	All	52-31-01

Repeat Inspection Intervals

Repeat Inspection	Effectivity	SID Numbers
1,000 Cycles	All	52-31-01
2,000 Hrs	All	57-10-04
2,500 Hrs	All	57-10-07
2,750 Hrs	All	57-10-01
5,500 Hrs	All	57-10-06
10,000 Hrs	All	57-10-06, 57-10-03

M7 AEROSPACE, LP
SA226 & SA227 SERIES
 SUPPLEMENTAL INSPECTION DOCUMENT
SUMMARY OF INSPECTIONS BY FLIGHT HOURS - SA227
Initial Inspections

Initial Inspection	Effectivity	SID Numbers
1,000 Hrs	All	27-31-01
1,000 Hrs	All with 27-62114 engine mount truss except S/N 892, 893 and 895 up	71-21-01
11,000 Hrs	All TT	57-10-07
11,800 Hrs	All up to S/N 591	57-10-06
14,300 Hrs	All	57-10-03
20,000 Hrs	All	57-10-05
35,000 Hrs	All up to S/N 786	55-10-01
37,500 Cycles	All	52-31-01

Repeat Inspection Intervals

Repeat Inspection	Effectivity	SID Numbers
1,000 Cycles	All	52-31-01
2,500 Hrs	All TT	57-10-07
5,000 Hrs	All	57-10-05
5,500 Hrs	All up to S/N 591	57-10-06
10,000 Hrs	All	57-10-03

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

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M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

SECTION III – SUPPLEMENTAL INSPECTION DOCUMENTS

TITLE **SUPPLEMENTAL INSPECTION NUMBER: 27-31-01**

SA226/SA227 Control Column Roller Bearing

EFFECTIVITY

SA226 - All
SA227 – All
CC / DC - 784, 790-904

INSPECTION COMPLIANCE

INITIAL 1,000 HOURS
REPEAT N/A

PURPOSE

Replacement of control column roller bearing and support structure with fatigue-resistant design.

INSPECTION INSTRUCTIONS

1. Accomplish Fairchild Service Bulletin 226-27-061, 227-27-042 or CC7-27-011 if not already accomplished.

ACCESS/LOCATION

Cockpit Floor

DETECTABLE CRACK SIZE

N/A

INSPECTION METHOD

N/A

REPAIR/MODIFICATION

Refer to Fairchild Service Bulletin 226-27-061, 227-27-042 or CC7-27-011.

COMMENTS

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SA226/SA227 Cargo Door Hinge

SUPPLEMENTAL INSPECTION NUMBER: 52-31-01

EFFECTIVITY

SA226 - All
SA227 - All

INSPECTION COMPLIANCE

INITIAL 37,500 CYCLES SINCE NEW
REPEAT 1,000 CYCLES (if not replaced)

PURPOSE

Inspection or replacement of cargo door hinge.

INSPECTION INSTRUCTIONS

1. Hinge may be replaced at 37,500 cycles or any time thereafter in lieu of inspection. See the parts catalog and maintenance manual for replacement information.
2. If inspection is chosen, refer to Section IV (NDI Inspection), Supplemental Inspection Number 52-31-01 for specific inspection instructions.

ACCESS/LOCATION

Fuselage at cargo door upper sill

DETECTABLE CRACK SIZE

0.10 inch

INSPECTION METHOD

Surface Eddy Current

REPAIR/MODIFICATION

Replace with a new part before further flight.

COMMENTS

If a crack is detected, contact M7 Aerospace Service Engineering.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE **SUPPLEMENTAL INSPECTION NUMBER: 55-10-01**

SA226/SA227 Rib Strap at Horizontal Stabilizer Rear Spar at BL 3.1

EFFECTIVITY

SA226 - All
SA227 – All airplanes up to S/N 786

INSPECTION COMPLIANCE

INITIAL	35,000 HOURS SINCE NEW
REPEAT	N/A

PURPOSE

Reinforcement of horizontal stabilizer rear spar upper and lower caps to eliminate possible fatigue cracking of rib strap at BL 3.1.

INSPECTION INSTRUCTIONS

1. Accomplish Fairchild Service Bulletin 226-55-011 or 227-55-007 if not already accomplished.

ACCESS/LOCATION

Horizontal Stabilizer Rear Spar

DETECTABLE CRACK SIZE

N/A

INSPECTION METHOD

Refer to Fairchild Service Bulletin 226-55-011 or 227-55-007.

REPAIR/MODIFICATION

Refer to Fairchild Service Bulletin 226-55-011 or 227-55-007.

COMMENTS

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-01

SA226 Wing Main Spar Lower Cap at Station 99

EFFECTIVITY

INSPECTION COMPLIANCE

SA226 - All	INITIAL	24,750 HOURS
Except TC398 & up	REPEAT	2,750 HOURS
T(B) 303E & up		
AT 423 & up		

PURPOSE

Inspection of aluminum spar cap extrusions for fatigue cracks or other damage.

INSPECTION INSTRUCTIONS

1. Defuel the wings in accordance with the applicable Service/Maintenance Manual.
2. Gain access to the spar at station 99 by removing the outboard nacelle access panel beneath the main spar, the two fuel tank access panels outboard of the nacelle, and the fuel tank access panel aft of the nacelle. Refer to SA226 MM for removal instructions.
3. Inspect left and right wing. Refer to Section IV (NDI Inspection), Supplemental Inspection Number 57-10-01 for specific inspection instructions.
4. Vacuum all loose sealant and other particles from fuel tank.
5. Reseal in accordance with SRM 51-30-03
6. Close out the fuel tank and nacelle in accordance with SA226 MM.

ACCESS/LOCATION

DETECTABLE CRACK SIZE

Wings

0.10 inch

INSPECTION METHOD

Surface Eddy Current

REPAIR/MODIFICATION

COMMENTS

Detection of a crack may indicate complete failure of the part. If a crack is detected, contact M7 Aerospace Service Engineering.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-02

SA226 Wing Main Spar Lower Cap at Station 9

EFFECTIVITY

SA226
T – 201-275, 277-291
T(B) – 276, 292-393 except 303E
TC – 201-397
AT – 001-074 except 070

INSPECTION COMPLIANCE

INITIAL 14,000 HOURS
REPEAT 10,000 HOURS

PURPOSE

Inspection of aluminum spar cap extrusions for fatigue cracks or other damage.

INSPECTION INSTRUCTIONS

1. If the forward and aft pressure plates do not have access panels installed at station 9, accomplish Fairchild Service Bulletin 226-57-006 (T) and (TB), 226-57-007 (AT), or 226-57-008 (TC).
2. Gain access to the main spar lower cap at station 9 by removing access panels on forward and aft pressure plates.
3. Inspect left and right wing. Refer to Section IV (NDI Inspection), Supplemental Inspection Number 57-10-02 for specific inspection instructions.
4. Reseal in accordance with SRM 51-30-03
5. Close out access panels in accordance with the Maintenance Manual.

ACCESS/LOCATION

Wings

DETECTABLE CRACK SIZE

0.10 inch

INSPECTION METHOD

Surface Eddy Current

REPAIR/MODIFICATION

COMMENTS

Detection of a crack may indicate complete failure of the part. If a crack is detected, contact M7 Aerospace Service Engineering.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-03

SA226/SA227 Wing Main Spar Lower Cap at Station 9

EFFECTIVITY

INSPECTION COMPLIANCE

SA226 T(B) – 303E, 394-417	INITIAL	14,300 HOURS
TC – 398-419	REPEAT	10,000 HOURS
AT – 070		
SA227 ALL		
CC / DC - 784, 790-904		

PURPOSE

Inspection of aluminum spar cap extrusions for fatigue cracks or other damage.

INSPECTION INSTRUCTIONS

1. Inspect left and right wing per FMP 57-011 (See Appendix C). Inspect all bolt holes in the spar cap from wing station 7 to 11 left and right.

ACCESS/LOCATION

DETECTABLE CRACK SIZE

Wings

0.08 inch

INSPECTION METHOD

Bolt Hole Eddy Current

REPAIR/MODIFICATION

COMMENTS

If a crack is detected, contact M7 Aerospace Service Engineering.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-04

SA226 Wing Rear Spar Lower Cap at Station 27

EFFECTIVITY

SA226 - All

INSPECTION COMPLIANCE

INITIAL 16,500 HOURS

REPEAT 2,000 HOURS

PURPOSE

Inspection of aluminum spar cap angle for fatigue cracks or other damage.

INSPECTION INSTRUCTIONS

1. Remove wing fairing and access panel.
2. Inspect left and right wing. Refer to Section IV (NDI Inspection), Supplemental Inspection Number 57-10-04 for specific inspection instructions.
3. Close out access panel and install wing fairing.

ACCESS/LOCATION

Wings

DETECTABLE CRACK SIZE

0.10 inch

INSPECTION METHOD

Surface Eddy Current

REPAIR/MODIFICATION

COMMENTS

If a crack is detected, contact M7 Aerospace Service Engineering.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-05

SA227 Wing Main Spar Lower Cap at Station 99

EFFECTIVITY

INSPECTION COMPLIANCE

SA227 - All
CC/DC - 784, 790-904

INITIAL	20,000 HOURS
REPEAT	5,000 HOURS

PURPOSE

Inspection of aluminum spar cap extrusions for fatigue cracks or other damage.

INSPECTION INSTRUCTIONS

1. Defuel the wings in accordance with the applicable Service/Maintenance Manual.
2. Gain access to the spar from stations 99 to 130 by removing the outboard nacelle access panel beneath the main spar, the fuel tank access panels outboard of the nacelle, and the fuel tank access panel aft of the nacelle. Refer to SA227 or Commuter Category MM for removal instructions.
3. Inspect left and right wing. Refer to Section IV (NDI Inspection), Supplemental Inspection Number 57-10-05 for specific inspection instructions.
4. Vacuum all loose sealant and other particles from fuel tank.
5. Reseal in accordance with SRM 51-30-03
6. Close out the fuel tank and nacelle in accordance with SA227 or Commuter Category MM.

ACCESS/LOCATION

DETECTABLE CRACK SIZE

Wings

0.10 inch

INSPECTION METHOD

Surface Eddy Current

REPAIR/MODIFICATION

COMMENTS

Detection of a crack may indicate complete failure of the part. If a crack is detected, contact M7 Aerospace Service Engineering.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-06

SA226/SA227 Lower Wing Skin Splice at WS 27

EFFECTIVITY

INSPECTION COMPLIANCE

SA226 - All	INITIAL	11,800 HOURS
SA227 – Up to S/N 591	REPEAT	5,500 HOURS

PURPOSE

Inspect for cracks in belly skin at splice strap and in stringers 16-21 inboard of rib at WS 27.

INSPECTION INSTRUCTIONS

1. Gain access to inside of wing between main spar and rear spar by removing four access doors and two landing lights (models with landing lights on belly) or six access doors (models with no landing lights on belly). Refer to SA226 or SA227 MM for removal instructions.
2. Inspect left and right wing. Refer to Section IV (NDI Inspection), Supplemental Inspection Number 57-10-06 for specific inspection instructions.
3. Close out the wing in accordance with SA226 or SA227 MM.

ACCESS/LOCATION

DETECTABLE CRACK SIZE

Inside center wing

0.10 inch

INSPECTION METHOD

Surface Eddy Current

REPAIR/MODIFICATION

COMMENTS

If a crack is detected, contact M7 Aerospace Service Engineering.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-07

SA226/SA227 Wing Lower Center Section Skin at Landing Light Cutout

EFFECTIVITY

SA226 - All
SA227-TT - All

INSPECTION COMPLIANCE

INITIAL 11,000 HOURS
REPEAT 2,500 HOURS

PURPOSE

Inspection of belly skin around landing light cutout for fatigue cracks and other damage.

INSPECTION INSTRUCTIONS

1. Refer to Section IV (NDI Inspection), Supplemental Inspection Number 57-10-07 for specific inspection instructions.

ACCESS/LOCATION

Wing

DETECTABLE CRACK SIZE

0.15 inch

INSPECTION METHOD

Surface Eddy Current

REPAIR/MODIFICATION

COMMENTS

If a crack is detected, contact M7 Aerospace Service Engineering.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 71-21-01

SA227 Engine Mount at Firewall

EFFECTIVITY

SA227 – All airplanes with
27-62114 engine mount truss
except S/N 892, 893, and 895 and up.

INSPECTION COMPLIANCE

INITIAL	NEXT SCHEDULED ENGINE REMOVAL OR WITHIN 1,000 HOURS
REPEAT	N/A (ONE-TIME ONLY)

PURPOSE

Inspection of engine mount truss for cracks and replacement of washer.

INSPECTION INSTRUCTIONS

1. This SID inspection is not required if Fairchild Service Bulletin 227-71-008 or CC7-71-001 has already been accomplished on both engine mount trusses.
2. Remove the engine mount truss from the aircraft per the maintenance manual.
3. Refer to Section IV (NDI Inspection), Supplemental Inspection Number 71-21-01 for specific inspection instructions which are in addition to the Service Bulletin.
4. Accomplish Fairchild Service Bulletin 227-71-008 or CC7-71-001. The inspection portion of the bulletin is not required if this SID inspection is performed.

NOTE: PERFORMING MAINTENANCE ON BOTH ENGINES AT THE SAME TIME CAN INCREASE THE PROBABILITY OF DUAL ENGINE FAILURE. IT IS RECOMMENDED TO STAGGER ENGINE REMOVALS TO COMPLY WITH THIS SID.

ACCESS/LOCATION

Nacelle at Firewall

DETECTABLE CRACK SIZE

0.10 inch

INSPECTION METHOD

Fluorescent Penetrant

REPAIR/MODIFICATION

Refer to Fairchild Service Bulletin 227-71-008 or CC7-71-001.

COMMENTS

If a crack is detected, contact M7 Aerospace Service Engineering.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

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M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

SECTION IV – INSPECTION METHODS AND REQUIREMENTS

GENERAL REQUIREMENTS

1. General

- A. Facilities performing nondestructive inspection as defined in this Supplemental Inspection Document must hold a valid FAA Repair Station Certificate with a Specialized Service Rating in the applicable method of nondestructive inspection.
- B. Facilities performing nondestructive inspection as defined in this SID must own or have access to test equipment capable of performing the inspection and reporting the test results as defined in this manual.
- C. Personnel performing nondestructive inspection defined in this Supplemental Inspection Document shall be certified to a minimum of Level II in the applicable inspection method as defined by the American Society for Nondestructive Testing, Recommended Practice Number SNT-TC-1A.
- D. Organizations and personnel engaged in the application of nondestructive inspection and operating under the jurisdiction of a foreign government shall use the appropriate documents issued by the applicable regulatory agency in complying with the above requirements.
- E. Further information on nondestructive testing can be found in the SA226/SA227 and Commuter Category Structural Repair Manual.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

GENERAL EDDY CURRENT INSPECTION

1. General

- A. Eddy current inspection is effective for the detection of surface or near surface cracks in non-ferrous metals. The inspection is accomplished by inducing eddy currents into the part and observing electrical variations of the induced field. The character of the observed field change is displayed and interpreted to determine the nature of the indication. This method can be applied to airframe parts or assemblies where the inspection area is accessible to contact by the eddy current probe. An important use of eddy current inspection is for the detection of cracking caused by corrosion or stress in and around fastener holes. Bolt hole eddy current probes are effective in detecting cracks emanating from the wall of a fastener hole. Surface probes can detect cracks around the fastener hole area with the fasteners installed.
- B. Eddy current inspection equipment requires that good contact be made between the probe and the part being tested unless a specific procedure requires a certain amount of liftoff. The area to be tested must be clean, dry, and free of dirt, grease, loose paint, or any other contaminants which could interfere with the eddy current inspection. Cleaning methods selected for a particular component shall be consistent with the contaminants to be removed and shall not be detrimental to the component itself or its intended function. All cleaning materials must be approved for use by the appropriate Fairchild / M7 Maintenance Manual or Structural Repair Manual.
- C. Conduct the inspection at the required locations as reference by the specific nondestructive inspection procedure. Scan the inspection area at width increments that do not exceed the width of the eddy current test coil. Wherever possible, the areas to be inspected using surface eddy current shall be scanned in two different directions. The scans shall be conducted at scan paths 90 degrees to each other. All areas that require bolt hole eddy current inspection shall be scanned for the entire depth of the hole. The bolt hole probe index rate shall not exceed the width of the eddy current test coil.
- D. If an indication is detected, carefully repeat the inspection in the opposite direction of probe movement to verify the indication. If the indication persists, carefully monitor the amount of probe movement or rotation required to cause the instrument to move off the maximum indication response.

2. Equipment

- A. In the development of the eddy current inspection techniques contained in this manual, the eddy current inspection equipment listed in the individual procedure was utilized. Equivalent eddy current test equipment may be used provided the equipment is capable of achieving the required frequency range and test sensitivity. When substitute equipment is used, it may be necessary to make adjustments to the established techniques.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

GENERAL FLUORESCENT LIQUID PENETRANT INSPECTION

1. General

- A. Fluorescent liquid penetrant inspection is effective in detecting small cracks or discontinuities open to the surface which may not be evident by normal visual inspection. Liquid penetrant inspection can be used on most airframe parts and assemblies accessible for its application. The inspection is performed by applying a liquid which penetrates into surface discontinuities. Excessive penetrant is removed and a suitable developer is applied to draw the penetrant from the surface discontinuities. Visual indications are obtained by the fluorescence of the penetrant under the display of ultraviolet light.
- B. The inspection area must be clean and dry and free of dirt, grease, paint, or any other contaminants which would interfere with the liquid penetrant inspection. Cleaning and paint removal methods selected for a particular component shall be consistent with the contaminants to be removed and shall not be detrimental to the component or its intended function. All cleaning materials must be approved for use by the appropriate Fairchild / M7 Maintenance Manual, Structural Repair Manual or Nondestructive Testing Manual.
- C. Fluorescent liquid penetrant shall be accomplished in accordance with the procedures contained or referenced in the Supplemental Inspection Document. ASTM E1417, Standard Practice for Liquid Penetrant Examination, shall be consulted for the general requirements for liquid penetrant inspection. In the event of a conflict between the text of the Supplemental Inspection Document and ASTM E1417, the text of the Supplemental Inspection Document shall take precedence.

2. Materials and Equipment

- A. Fluorescent penetrant is the required inspection method when liquid penetrant inspection is specified in the Supplemental Inspection Document. Fluorescent penetrant inspection has a high sensitivity and the ability to detect small fatigue cracks open to the surface. Visible dye penetrant does not have the required sensitivity and shall not be used for the inspection of aircraft.
- B. Only materials approved for listing on QPL-25135 (refer to MIL-I-25135) shall be used for penetrant inspection. All materials shall be from the same family group. Interchanging or mixing of penetrant cleaners, penetrant materials, or developers from different manufacturers is prohibited.
- C. Penetrant materials are defined by specific classifications per MIL-I-25135 and must meet or exceed the classification listed below.
 - i. Type 1 (Fluorescent)
 - ii. Level 3 (High Sensitivity)
 - iii. Method C (Solvent Removable)

CAUTION: Type II (visible dye) penetrant shall not be used for the inspection of aircraft and aircraft components.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

GENERAL MAGNETIC PARTICLE INSPECTION

1. General

- A. Magnetic particle inspection is a nondestructive inspection method for revealing surface and near surface discontinuities in parts made of magnetic materials. Alloys which contain a high percentage of iron and can be magnetized make up the ferromagnetic class of metals. The magnetic particle inspection method will detect surface discontinuities including those that are too fine to be seen with the unaided eye and those that lie slightly below the surface. The magnetic particle inspection method consists of three basic operations:
- i. Establishment of a suitable magnetic field.
 - ii. Application of magnetic particles.
 - iii. Examination and evaluation of the particle accumulations.
- B. Electrical current is used to create or induce magnetic fields into the material. The direction of the magnetic field can be altered, and is controlled by the direction of the magnetizing current. The arrangement of the current paths is used to induce the magnetic lines of force so they intercept a discontinuity at a transverse direction. When a magnetic field within a part is interrupted by a discontinuity, some of the field is forced out into the air above the discontinuity. The presence of a discontinuity is detected by the application of finely divided fluorescent ferromagnetic particles to the surface of the part. Some of the particles will be gathered and held by the leakage field. The magnetically held collection of particles forms an outline of the discontinuity and indicates its location, size, and shape.
- C. Magnetic particle inspection shall be accomplished in accordance with the procedures contained or referenced in the Supplemental Inspection Document. ASTM E1444, Standard Practice for Magnetic Particle Examination, shall be consulted for general requirements for magnetic particle inspection. In the event of a conflict between the text of the Supplemental Inspection Document and ASTM 1444, the text of the Supplemental Inspection Document shall take precedence.

2. Materials and Equipment

- A. Fluorescent magnetic particle inspection has a high sensitivity and the ability to detect small fatigue cracks. Visible dry magnetic particles do not have the required sensitivity and shall not be used for inspection of aircraft.
- B. The specific magnetic particle equipment required to accomplish an inspection will be specified for each procedure contained in this manual.

CAUTION: CONTACT PRODS SHALL NOT BE USED ON AIRCRAFT COMPONENTS OR PARTS.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 52-31-01

SA226/SA227 Cargo Door Hinge

EFFECTIVITY

SA226 – All
SA227 - All

DESCRIPTION

Inspect for fatigue cracks in the cargo door hinge tabs and skin around fastener holes.

PREPARATION

1. Clean the inspection area with solvent to remove dirt, grease, oil, and other substances that may interfere with the inspection.

INSPECTION METHOD

Surface Eddy Current

CRACK SIZE

Minimum detectable crack size: 0.10 inch

EQUIPMENT

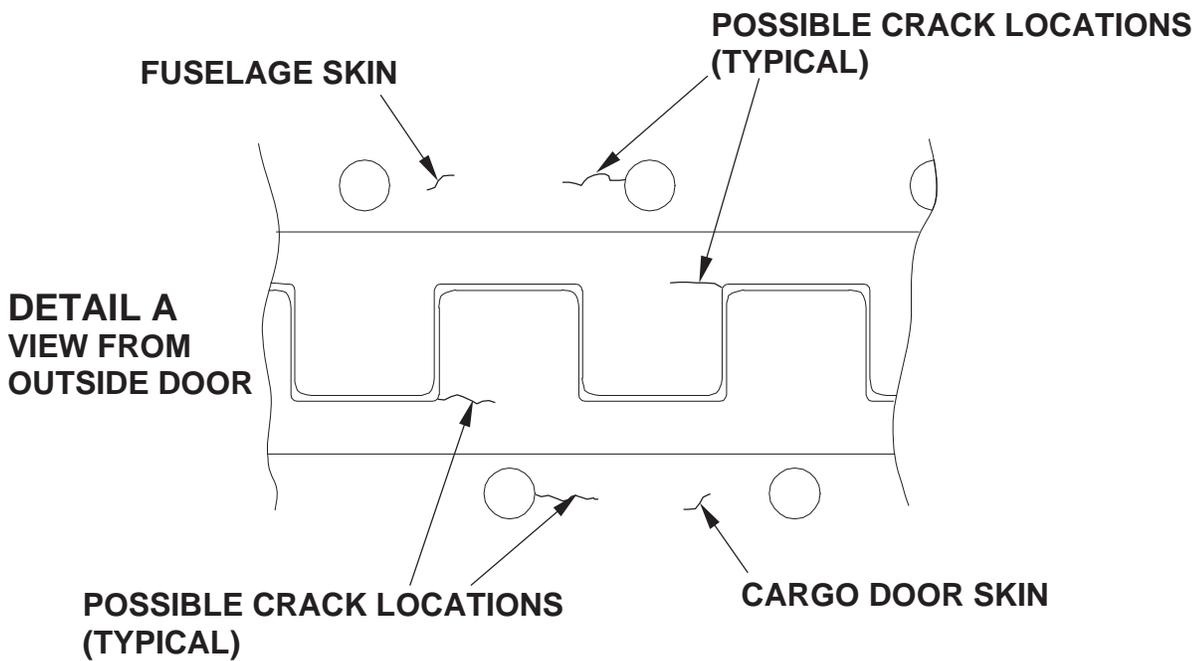
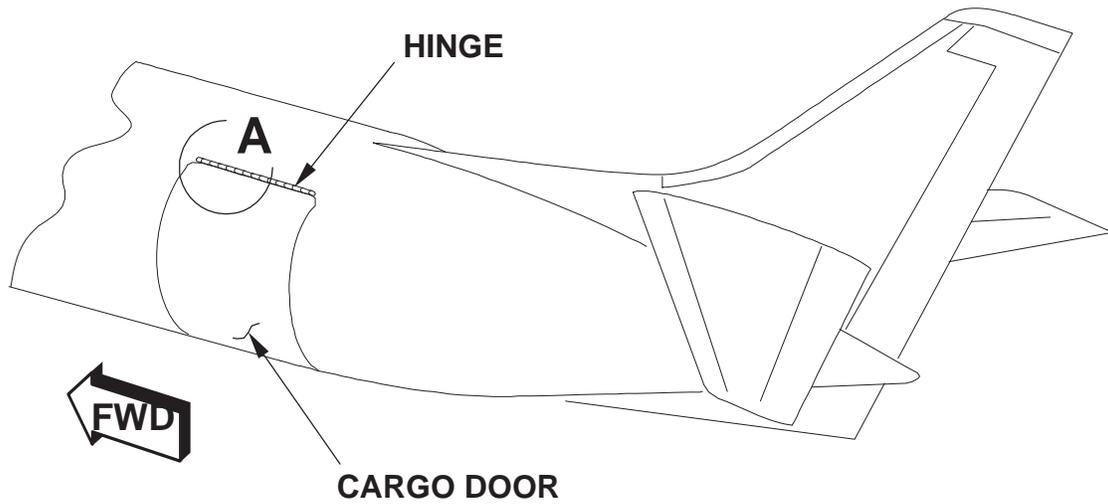
The following equipment is recommended to perform the inspection. Equivalent eddy current test equipment may be used provided that the equipment is capable of achieving the required frequency range and sensitivity.

- 100 to 500 KHz shielded absolute metal shaft probe, NORTEC stock no. 9213013. Note: this probe requires a separate cable.

INSPECTION INSTRUCTIONS

1. Adhere to procedures for Eddy Current Inspection given in the Structural Repair Manual, Chapter 51-30-07.
2. Refer to Figure 1. Inspect the hinge tabs and around fastener holes along the length of the hinge. Inspect the top piece (on fuselage) and bottom piece (on cargo door). Observe the phase and amplitude changes on the instrument.
3. Cracks are most likely to occur near the ends of the hinge.
4. If an indication is noted, carefully repeat the inspection pass in the opposite direction to verify the indication.
5. All cracks detected shall be reported to M7 Aerospace Service Engineering. Report the location, direction, and length of each crack.

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT



SIDCDHfig1

SA226/SA227 Cargo Door Hinge
Figure 1

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-01

SA226 Wing Main Spar Lower Cap at Station 99

EFFECTIVITY

SA226 – All except TC398 & up, T(B) 303E & up, AT 423 & up

DESCRIPTION

Inspect for fatigue cracks in the aluminum extrusions of the main spar lower cap at station 99.

PREPARATION

1. Remove sealant and other contaminants from those surfaces of the aluminum spar cap extrusions between stations 96 and 111 that are not hidden by other parts. These surfaces include the following: the fwd edges of the cap and fwd angle, the aft edges of the cap and aft angle, the vertical legs of the fwd and aft angles above the titanium straps, and the bottom of the cap protrusion from the wing skin. Refer to Figure 1.
2. Clean the inspection area with solvent to remove dirt, grease, oil, and other substances that may interfere with the inspection. Refer to Figure 1.

INSPECTION METHOD

Surface Eddy Current

CRACK SIZE

Minimum detectable crack size: 0.10 inch

EQUIPMENT

The following equipment is recommended to perform the inspection. Equivalent eddy current test equipment may be used provided that the equipment is capable of achieving the required frequency range and sensitivity.

- 100 to 500 kHz shielded absolute metal shaft probe, NORTEC stock no. 9213013. Note: this probe requires a separate cable.

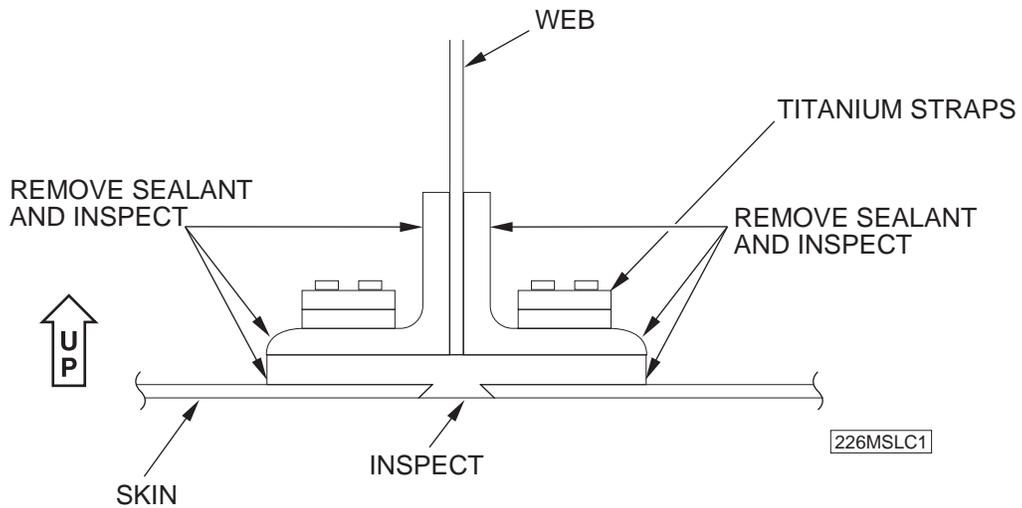
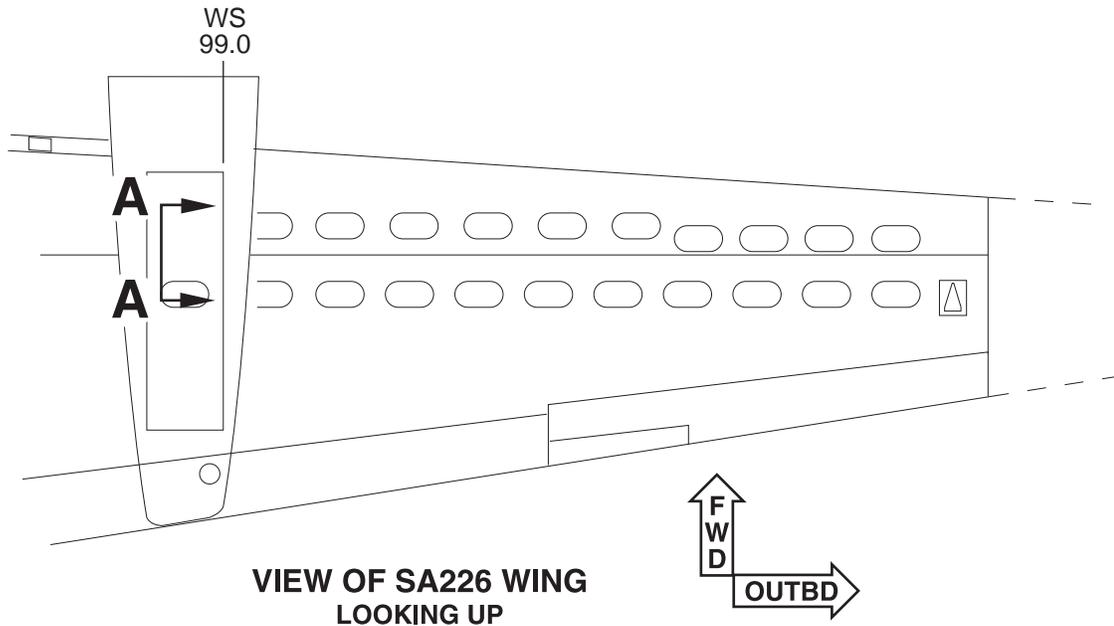
INSPECTION INSTRUCTIONS

1. Adhere to procedures for Eddy Current Inspection given in the Structural Repair Manual, Chapter 51-30-07.
2. Refer to Figure 2. Inspect the exposed surfaces of the aluminum spar cap extrusions between stations 96 and 111, left and right wing. Observe the phase and amplitude changes on the instrument.
 - 2.a For alternate Eddy Current inspection method between wing stations 104.71 and 111, refer to Appendix A of this document

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3. Cracks are most likely to occur at station 99, just inboard of where the titanium straps end.
4. Stations with fasteners are more likely to have cracks than stations without fasteners.
5. Detection of a crack may indicate complete failure of the part.
6. If an indication is noted, carefully repeat the inspection pass in the opposite direction to verify the indication.
7. All cracks detected shall be reported to M7 Aerospace Service Engineering. Report the location, direction, and length of each crack.

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**VIEW A-A
 MAINSPAR LOWER CAP
 (ROTATED FOR CLARITY)**

SA226 WING MAIN SPAR LOWER CAP AT WS 99.0
 FIGURE 2

M7 AEROSPACE, LP
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SUPPLEMENTAL INSPECTION DOCUMENT

TITLE **SUPPLEMENTAL INSPECTION NUMBER: 57-10-02**

SA226 Wing Main Spar Lower Cap at Station 9

EFFECTIVITY

SA226 - T 201-275, T 277-291, T(B) 276, T(B) 292-393 except 303E, TC 201-397, AT 001-074 except 070

DESCRIPTION

Inspect for fatigue cracks in the aluminum extrusions of the main spar lower cap at station 9.

PREPARATION

1. Clean the inspection area with solvent to remove dirt, grease, oil, and other substances that may interfere with the inspection. The inspection area includes the following surfaces between stations 8 and 13: the fwd edges of the cap and fwd angle, the aft edges of the cap and aft angle, the vertical legs of the fwd and aft angles above the titanium straps, and the bottom of the cap protrusion from the wing skin. Refer to Section IV, Figure 4, Page 15, SA226 Main Spar at W.S. 90.

INSPECTION METHOD

Surface Eddy Current

CRACK SIZE

Minimum detectable crack size: 0.10 inch

EQUIPMENT

The following equipment is recommended to perform the inspection. Equivalent eddy current test equipment may be used provided that the equipment is capable of achieving the required frequency range and sensitivity.

- 100 to 500 kHz shielded absolute metal shaft probe, NORTEC stock no. 9213013. Note: this probe requires a separate cable.

INSPECTION INSTRUCTIONS

1. Adhere to procedures for Eddy Current Inspection given in the Structural Repair Manual, Chapter 51-30-07.
2. Refer to Figure 4. Inspect the aluminum lower spar cap extrusions between stations 8 and 13, left and right wing. Observe the phase and amplitude changes on the instrument.
3. Stations with fasteners are more likely to have cracks than stations without fasteners.
4. Detection of a crack may indicate complete failure of the part.
5. If an indication is noted, carefully repeat the inspection pass in the opposite direction to verify the indication.
6. All cracks detected shall be reported to M7 Aerospace Service Engineering. Report the location, direction, and length of each crack.

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SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-04

SA226 Wing Rear Spar Lower Cap at Station 27

EFFECTIVITY

SA226 - All

DESCRIPTION

Inspect for fatigue cracks in the aft aluminum angle of the rear spar lower cap at station 27.

PREPARATION

1. Clean the inspection area with solvent to remove dirt, grease, oil, and other substances that may interfere with the inspection.

INSPECTION METHOD

Surface Eddy Current

CRACK SIZE

Minimum detectable crack size: 0.10 inch

EQUIPMENT

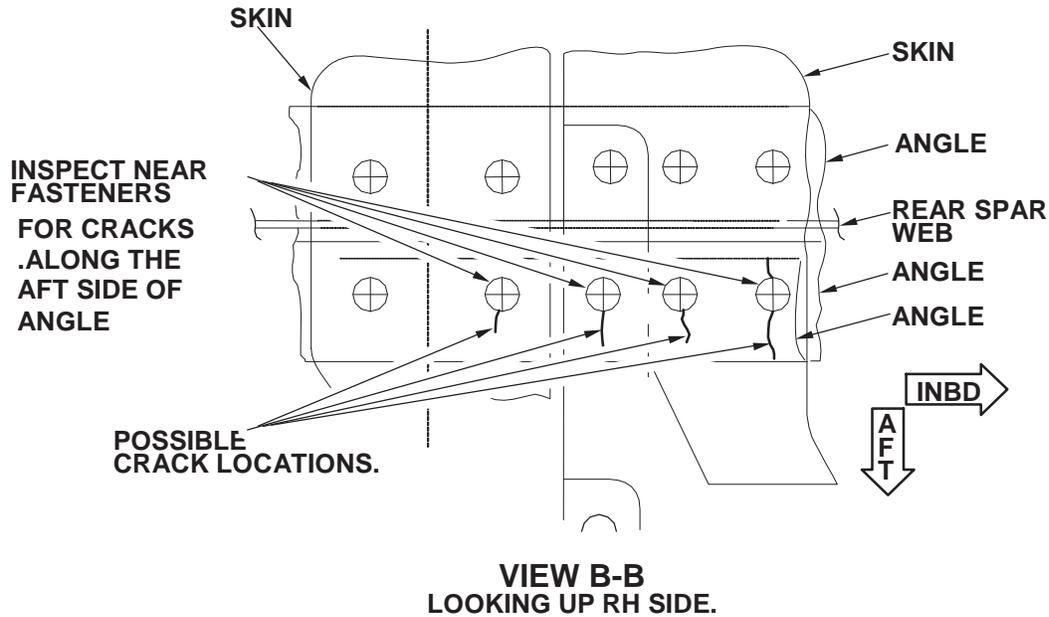
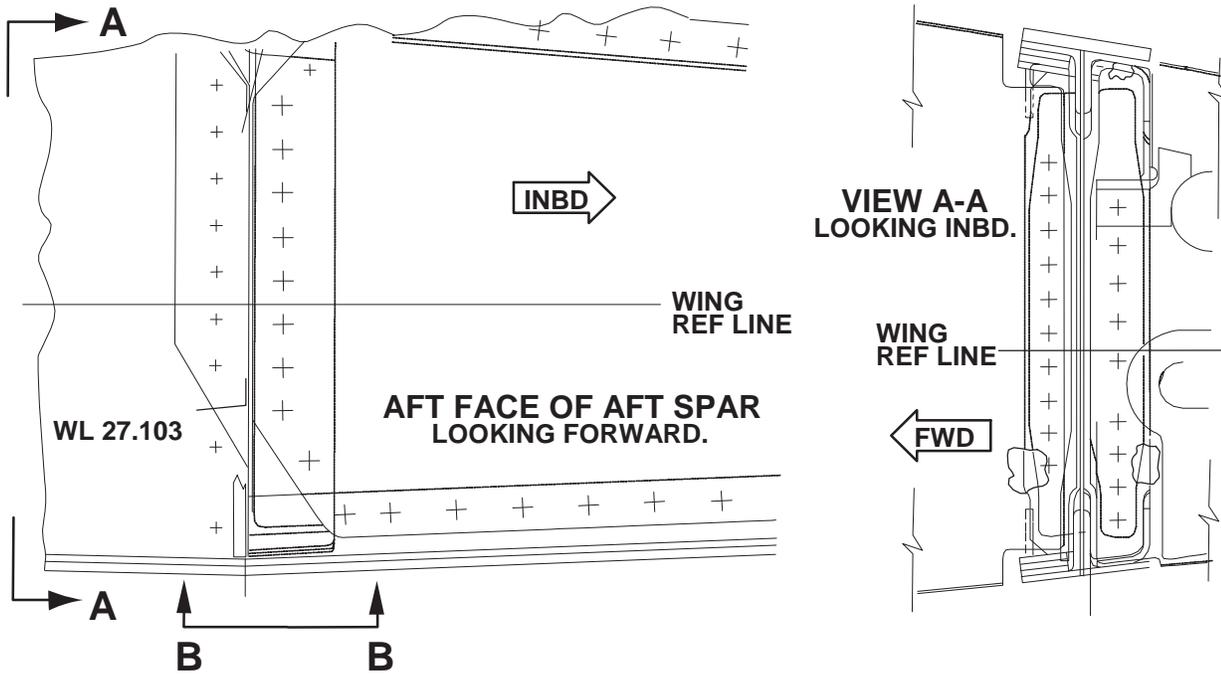
The following equipment is recommended to perform the inspection. Equivalent eddy current test equipment may be used provided that the equipment is capable of achieving the required frequency range and sensitivity.

- 100 to 500 KHz shielded absolute metal shaft probe, NORTEC stock no. 9213013. Note: this probe requires a separate cable.

INSPECTION INSTRUCTIONS

1. Adhere to procedures for Eddy Current Inspection given in the Structural Repair Manual, Chapter 51-30-07.
2. Refer to Section IV, Figure 3. Inspect aft aluminum spar cap angle along the aft edge between stations 24 and 27, left and right wing. Observe the phase and amplitude changes on the instrument.
3. If an indication is noted, carefully repeat the inspection pass in the opposite direction to verify the indication.
4. All cracks detected shall be reported to M7 Aerospace Service Engineering. Report the location, direction, and length of each crack.

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SA226 & SA227 SERIES
 SUPPLEMENTAL INSPECTION DOCUMENT



226RSLC1

SA226 WING REAR SPAR LOWER CAP AT WS 27
 FIGURE 3

M7 AEROSPACE, LP
SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-05

SA227 Wing Main Spar Lower Cap at Station 99

EFFECTIVITY

SA227 – All

DESCRIPTION

Inspect for fatigue cracks in the aluminum extrusions of the main spar lower cap at station 99 and 130.

PREPARATION

1. Remove sealant and other contaminants from those surfaces of the aluminum spar cap extrusions between stations 96 and 133 that are not hidden by other parts. These surfaces include the following: the fwd edges of the cap and fwd angle, the aft edges of the cap and aft angle, the vertical legs of the fwd and aft angles above the titanium straps, and the bottom of the cap protrusion from the wing skin. Refer to Section IV, Figure 2, Page 9.
2. Clean the area with solvent to remove dirt, grease, oil, and other substances that may interfere with the inspection. Inspection forward and aft side of the spar. Refer to Section IV, Figure 2, Page 9.

INSPECTION METHOD

Surface Eddy Current

CRACK SIZE

Minimum detectable crack size: 0.10 inch

EQUIPMENT

The following equipment is recommended to perform the inspection. Equivalent eddy current test equipment may be used if the equipment is capable of achieving the required frequency range and sensitivity.

- 100 to 500 kHz shielded absolute metal shaft probe, NORTEC stock no. 9213013. Note: this probe requires a separate cable.

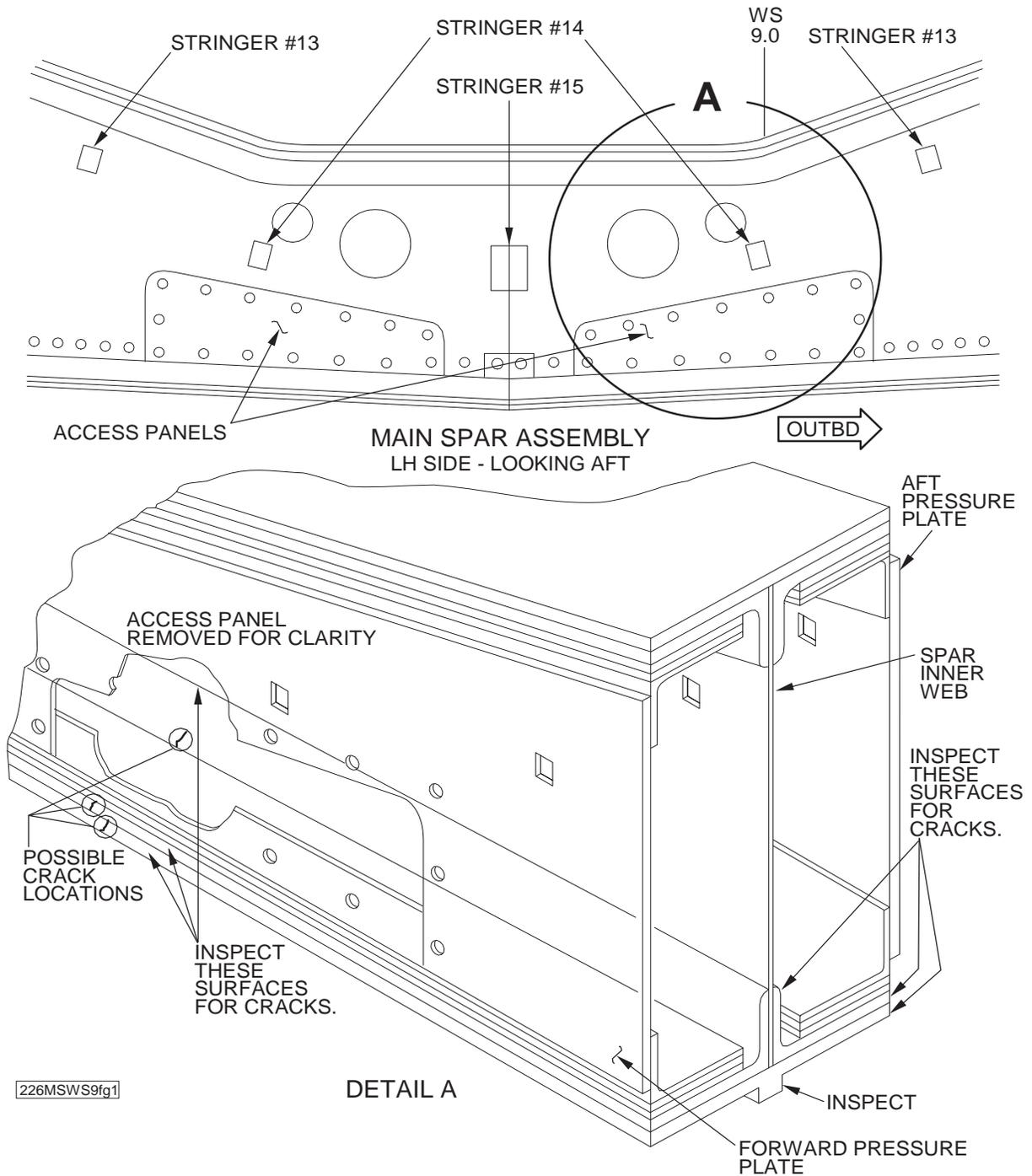
INSPECTION INSTRUCTIONS

1. Adhere to procedures for Eddy Current Inspection given in the Structural Repair Manual, Chapter 51-30-07.
2. Refer to Section IV, Figure 3. Inspect the exposed surfaces of the aluminum spar cap extrusions between stations 96 and 133, left and right wing. Observe the phase and amplitude changes on the instrument.
- 2.a For alternate Eddy Current inspection method between wing stations 104.71 and 133, refer to Appendix B of this document

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3. Cracks are most likely to occur at stations 99 and 130.
4. Stations with fasteners are more likely to have cracks than stations without fasteners.
5. Detection of a crack may indicate complete failure of the part.
6. If an indication is noted, carefully repeat the inspection pass in the opposite direction to verify the indication.
7. All cracks detected shall be reported to M7 Aerospace Service Engineering. Report the location, direction, and length of each crack.

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SA226 MAIN SPAR AT WS 9.0
 Figure 4

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SA226 & SA227 SERIES
SUPPLEMENTAL INSPECTION DOCUMENT

TITLE **SUPPLEMENTAL INSPECTION NUMBER: 57-10-06**

SA226/SA227 Lower Wing Skin Splice at WS 27

EFFECTIVITY

SA226 – All
SA227 – Up to S/N 591

DESCRIPTION

Inspect for fatigue cracks in the belly skin at splice strap and in stringers inboard of rib at WS27.

PREPARATION

1. Clean the inspection area with solvent to remove dirt, grease, oil, and other substances that may interfere with the inspection. Refer to Figure 1.

INSPECTION METHOD

Surface Eddy Current

CRACK SIZE

Minimum detectable crack size: 0.10 inch

EQUIPMENT

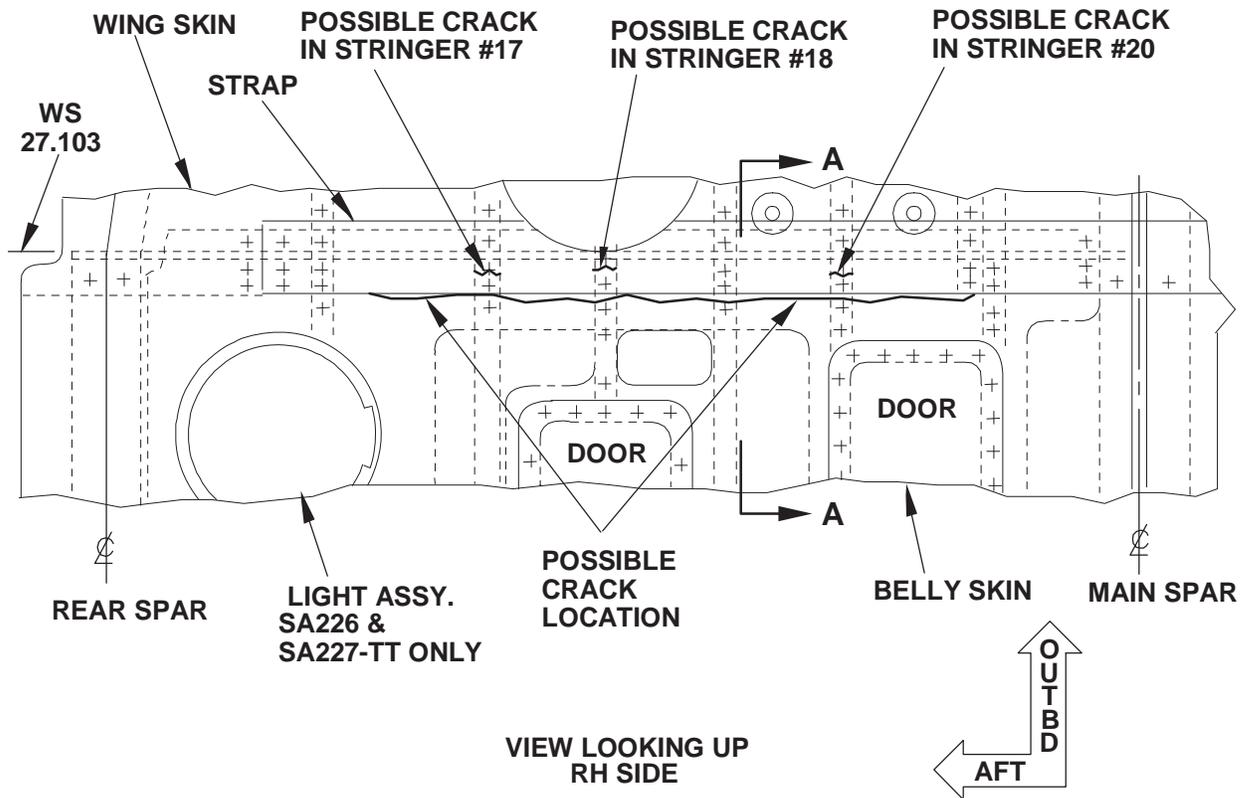
The following equipment is recommended to perform the inspection. Equivalent eddy current test equipment may be used provided that the equipment is capable of achieving the required frequency range and sensitivity.

- 100 to 500 KHz shielded absolute metal shaft probe, NORTEC stock no. 9213013. Note: this probe requires a separate cable.

INSPECTION INSTRUCTIONS

1. Adhere to procedures for Eddy Current Inspection given in the Structural Repair Manual, Chapter 51-30-07.
2. Refer to Section IV, Figure 5, Sheets 1 and 2. Inspect the outside surface of the belly skin just inboard of the splice strap at WS 27, left and right side, from main spar to rear spar.
3. Inspect the inside surface of the belly skin around the fastener holes in the splice just inboard of WS 27, left and right side, from main spar to rear spar. Refer to Figure 5, Sheet 2.
4. Inspect stringers 16 through 21 around the fastener holes just inboard of the rib at WS 27, left and right side. Refer to Figure 5, Sheets 1 and 2.
5. If an indication is noted, carefully repeat the inspection pass in the opposite direction to verify the indication.
6. All cracks detected shall be reported to M7 Aerospace Service Engineering. Report the location, direction, and length of each crack.

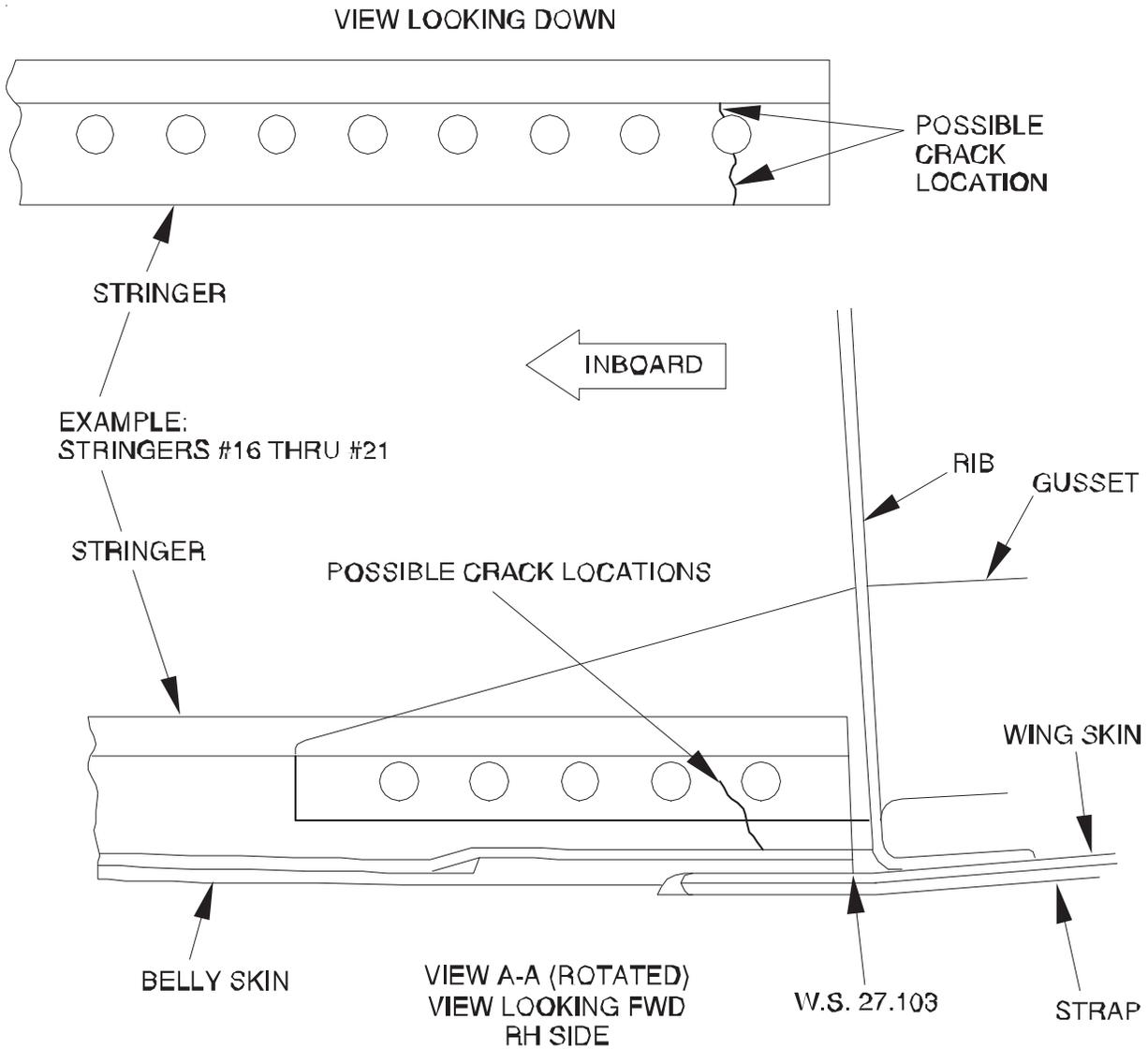
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SA226 & SA227 SERIES
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SIDlws27f1-1

SA226/SA227 LOWER WING SKIN SPLICE AT WS 27
 FIGURE 5 (SHEET 1)

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SIDlws27f1-2

SA226/SA227 LOWER WING SKIN SPLICE AT WS 27
 FIGURE 5 (SHEET 2)

M7 AEROSPACE, LP
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SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 57-10-07

SA226/SA227 Wing Lower Center Section Skin at Landing Light Cutout

EFFECTIVITY

SA226 – All
SA227-TT - All

DESCRIPTION

Inspect for fatigue cracks in belly skin around the landing light cutout.

PREPARATION

1. Clean the inspection area with solvent to remove dirt, grease, oil, and other substances that may interfere with the inspection.

INSPECTION METHOD

Surface Eddy Current

CRACK SIZE

Minimum detectable crack size: 0.15 inch

EQUIPMENT

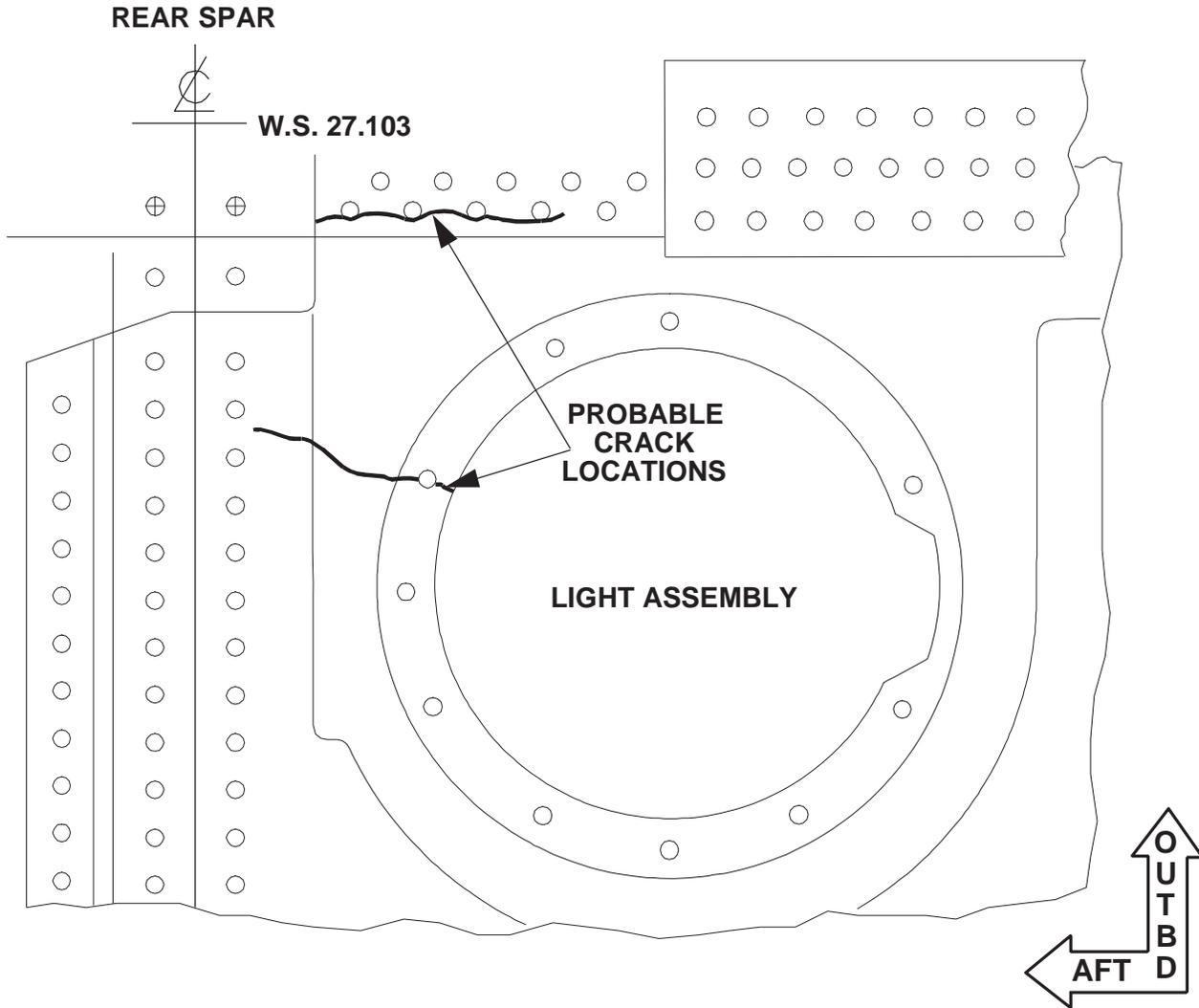
The following equipment is recommended to perform the inspection. Equivalent eddy current test equipment may be used provided that the equipment is capable of achieving the required frequency range and sensitivity.

- 100 to 500 kHz shielded absolute metal shaft probe, NORTEC stock no. 9213013. Note: this probe requires a separate cable.

INSPECTION INSTRUCTIONS

1. Adhere to procedures for Eddy Current Inspection given in the Structural Repair Manual, Chapter 51-30-07.
2. Refer to Section IV, Figure 6. Inspect externally the belly skin around landing light cutout and at splice strap of belly skin to center wing skin. Observe the phase and amplitude changes on the instrument.
3. If an indication is noted, carefully repeat the inspection pass in the opposite direction to verify the indication.
4. All cracks detected shall be reported to M7 Aerospace Service Engineering. Report the location, direction, and length of each crack.

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SUPPLEMENTAL INSPECTION DOCUMENT



SID226WLCf1

SA226/SA227 WING CENTER SECTION SKIN AT LANDING LIGHT
FIGURE 6

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SUPPLEMENTAL INSPECTION DOCUMENT

TITLE

SUPPLEMENTAL INSPECTION NUMBER: 71-21-01

SA227 Engine Mount at Firewall

EFFECTIVITY

SA227 – All airplanes with 27-62114 engine mount truss, except S/N 892, 893, and 895 and up.

DESCRIPTION

Inspect for fatigue cracks in end plate and at weld of end plate to tubing.

PREPARATION

1. Clean the inspection area with solvent to remove dirt, grease, oil, and other substances that may interfere with the inspection.
2. Remove paint and primer from the inspection area using an approved chemical paint stripper.

INSPECTION METHOD

Fluorescent Penetrant

CRACK SIZE

Minimum detectable crack size: 0.10 inch

EQUIPMENT

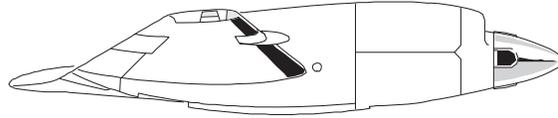
The following materials are recommended to perform the inspection. Equivalent materials may be used provided they have Type 1, Level 3 sensitivity and are capable of achieving the requirements listed in the General section, Fluorescent Penetrant Inspection, of this SID.

- General Purpose Zyglo Kit, ZA-59, P/N 602585.

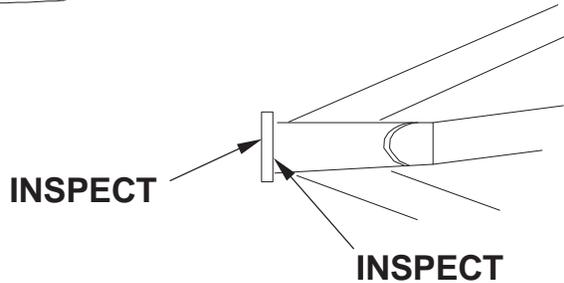
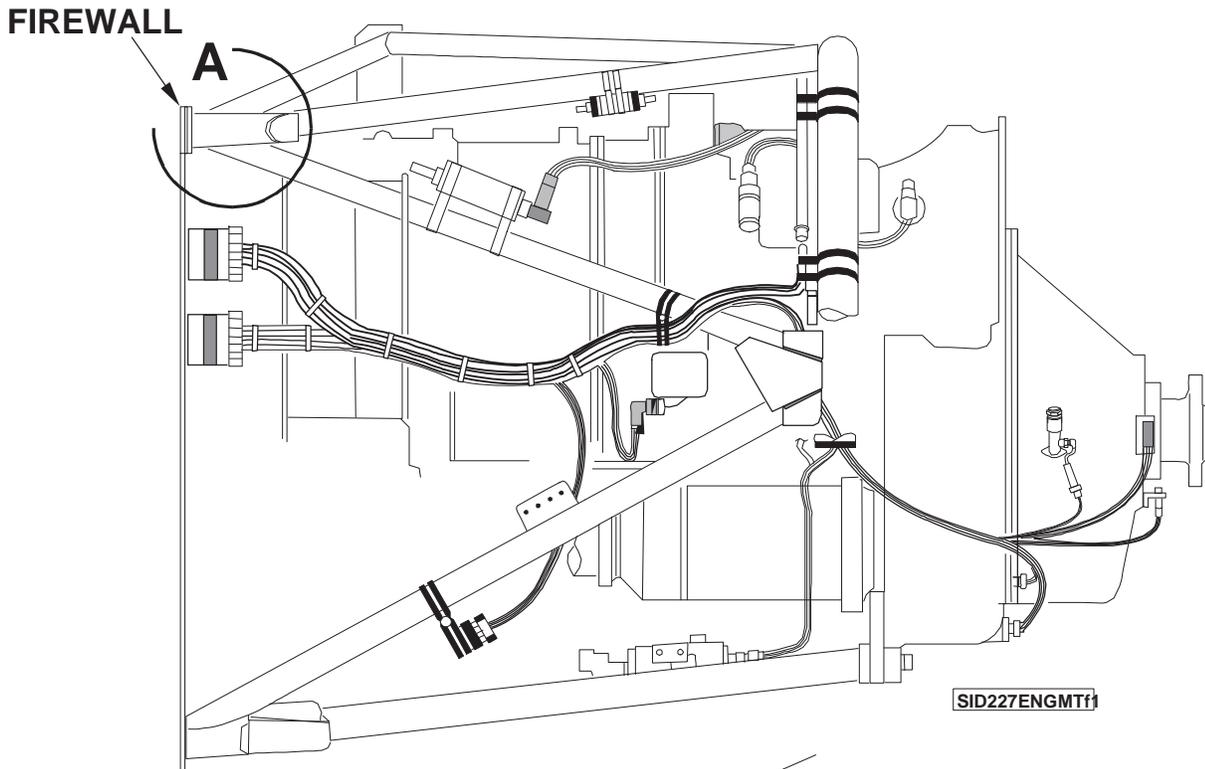
INSPECTION INSTRUCTIONS

1. Adhere to procedures for Fluorescent Penetrant Inspection given in the Structural Repair Manual, Chapter 51-30-07.
2. Refer to Section IV, Figure 7. Inspect end plate at both upper mount points on truss. Inspect face of end plate and where end plate is welded to tubing, as shown in Figure 7.
3. All cracks detected shall be reported to M7 Aerospace Service Engineering. Report the location, direction, and length of each crack.
4. If no cracks are found, prime and paint stripped areas in accordance with Structural Repair Manual. Do not prime or paint mating surface of end plate where it contacts firewall.

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LH/RH ENGINE



DETAIL A (2 PLACES)

**SA227 ENGINE MOUNT AT FIREWALL
FIGURE 7**

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APPENDIX A

Inspection Procedure to Detect Cracks in the
SA226 Wing Spar Lower Cap
for Metro-Fairchild Aircraft
Using Low Frequency Eddy Current

1. Purpose

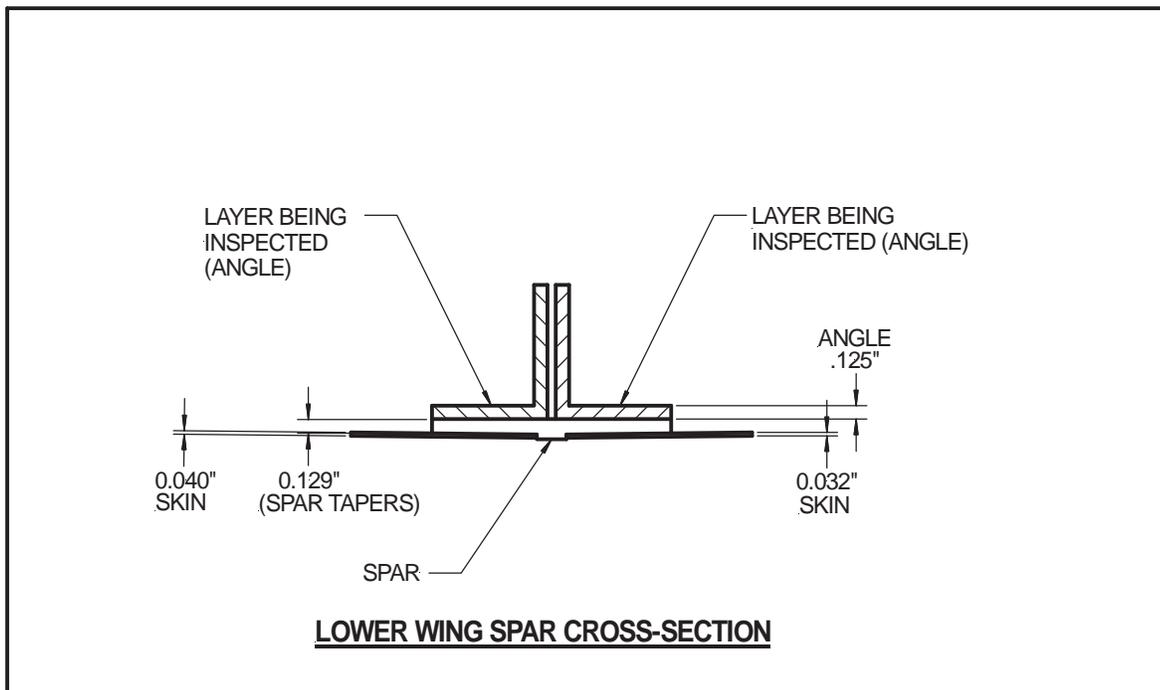
The purpose of this inspection procedure is to detect fatigue cracks at fastener sites in the third layer of material (the angle) in the main wing spar lower cap. This procedure uses an impedance plane eddy current instrument and a low frequency eddy current “ring” probe.

Note: It is recommended that the inspector using this procedure be experienced and well founded in the fundamentals of eddy current testing. Inspectors should fully possess the qualification of eddy current testing personnel as defined in Recommended Practice No. SNT-TC-1A, Personnel Qualification and Certification in Nondestructive Testing, available from ASNT (American Society for Nondestructive Testing) or equivalent.

2. Overview of Aircraft Structure

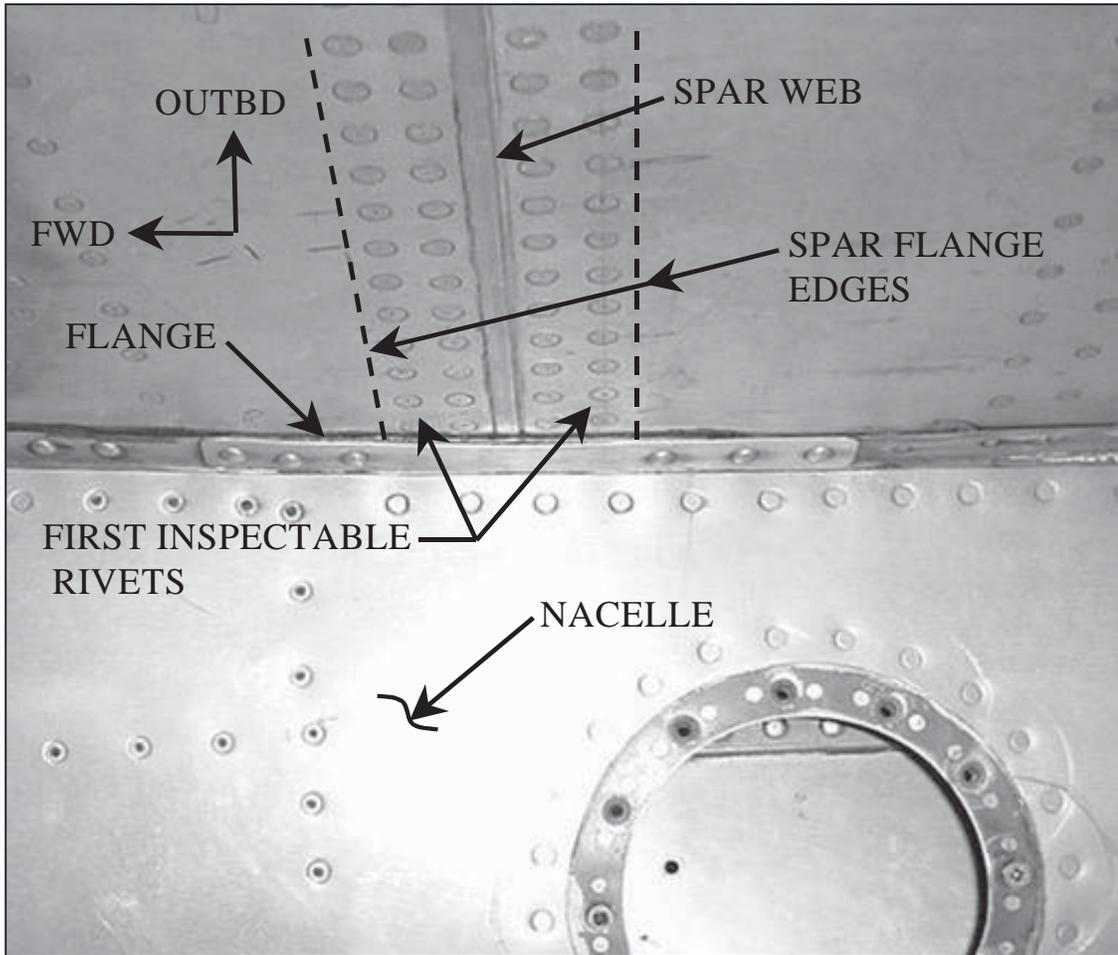
The area of inspection (lower wing spar) consists of several layers of material. The main concern is the angle stiffener as shown in Figure 1. The inspection area specified in the SID (Supplemental Inspection Document) is from W.S. 96 to W.S. 111. The inspection area using this technique is from W.S. 104.71 (1st fastener outbd of nacelle flange) to W.S. 111. The inspection area is situated adjacent to the engine nacelle as shown in Figure 2. The first fastener outboard of the nacelle flange is where the inspection begins (see “First Inspectable Rivet” label in Figure 2) and continues to station 111. The outside fastener rows are the only ones required to be inspected. The area inside the nacelle (W.S. 96 to W.S. 104) cannot be inspected using this technique. The fastener patterns and fastener types may also vary on this aircraft model so special care must be taken to insure that the pattern and fastener type in the inspection area matches the configuration shown in Figure 3. If the configuration does not match the aircraft being inspected do not continue with this inspection method. You should contact M7 Aerospace Service Engineering at (210) 824-9421, Ext 7663. Inconsistent inspection results can occur if the fastener type on the aircraft does not match the one on the calibration standard. Figure 4 shows the fastener used in the area of the inspection, which is an aluminum rivet (MS20426, Type BB5) with a 100-degree countersink.

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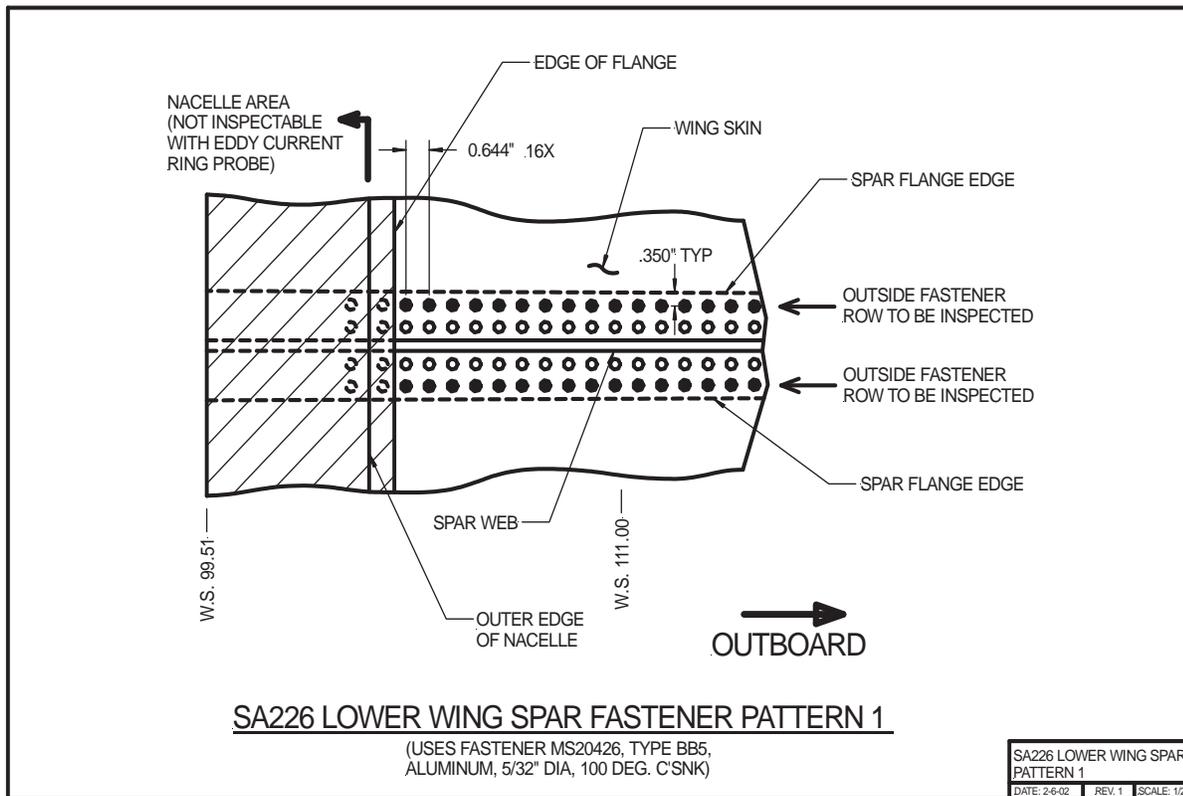
LOWER WING SPAR CROSS-SECTION
FIGURE 1

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SA226 LEFT SIDE WING INSPECTION AREA (Fastener Pattern 1)
FIGURE 2

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SA226 LOWER WING SPAR FASTENER PATTERN 1 (View from underside of wing)
 FIGURE 3

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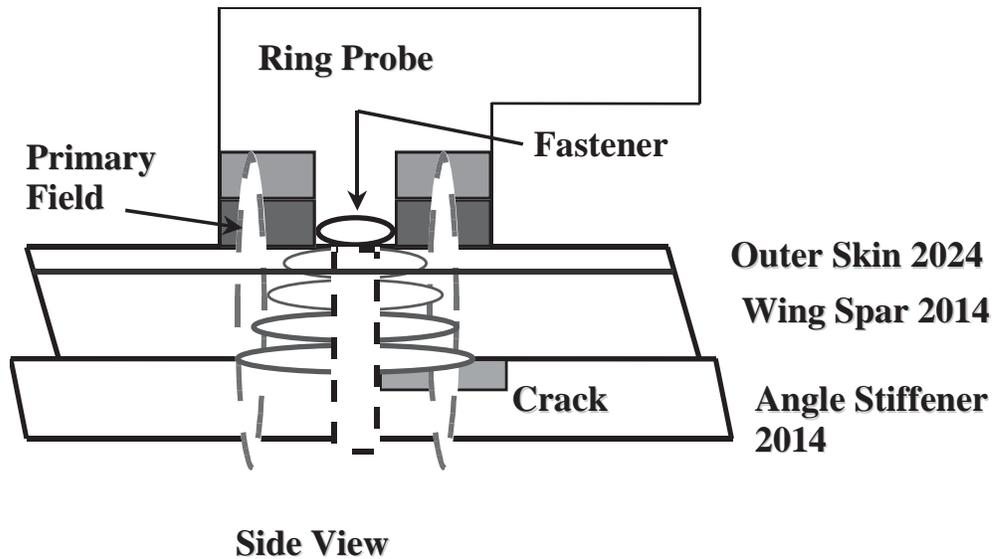
SA226 FASTENER TYPE
FIGURE 4

3. Equipment

- A. A portable impedance plane eddy current instrument with digital storage display. The equipment used to develop this procedure was Staveley Instruments model Nortec 19 eII, 1000S, 2000D and Zetec MIZ-22.
- B. An eddy current reflectance probe with a 100 Hz to 5 kHz frequency and an outside diameter no greater than 0.75-in. (19.05-mm). The probe used to develop this procedure was manufactured by Staveley, NECP-1037 reflectance probe with an inside diameter (ID) 0.33-in. (8.38-mm) and outside diameter (OD) 0.75-in. (19.05-mm) operating between 100 Hz and 5 kHz.
- C. Figure 6 shows the specific design parameters on the SA226 aircraft calibration standard. **Special attention should be taken to ensure calibration is being completed on the appropriate standard with the same fastener pattern and fastener type as the aircraft being inspected.** The calibration standard (Figure 6) is made of 2024 aluminum (outer skin) 1.016-mm (0.040-in.), 2014 aluminum (wing spar), aluminum 2014 angle stiffener. Note: The aircraft can have different skin thicknesses (0.040" and 0.032") in the inspection area, the 0.040" skin was selected for the calibration standard and is suitable to use for the .032" skin inspections. The fasteners on the calibration standard are the MS20426 rivets, type BB5. The aluminum standard

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should be smooth and free of dirt before starting calibration. Verification of the design features on the calibration standards described above should be included with the calibration standards. An inspection report should include the size and location of the holes and EDM notch widths and lengths. A copy of the inspection report should stay with the calibration standard.



EDDY CURRENT RING PROBE CENTERED OVER FASTENER AND MATERIAL
CROSS-SECTION
FIGURE 5

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5. Instrument Calibration Lower Wing Spar SA226 Fastener Pattern 1

- A. Turn the instrument power on and check the battery charge status. The instrument should have at least 80% of available battery capacity (Battery Voltage Maximum times 20%). The screen brightness and contrast of the display screen should match the environmental conditions (i.e., outside sunlight or inside a hangar).
- B. Depending on the eddy current instrument used, select or verify the 'reflection probe' setting from the probe selection menu. Connect the cable to the proper connector location. Set the frequency to 600 Hz. This procedure was developed using 600 Hz.
- C. Place the eddy current probe at POS. B (clean fastener) on the calibration standard, reference (Figure 6). **It is important to center the probe over each fastener during the calibration and inspection. If the probe is located off center it could cause a signal response that could be misinterpreted for a flaw (Figure 5).** Press the 'null' or 'balance' button. Lift the probe off the calibration standard. Observe the signals on the screen. Change the position of the nulled dot to the lower right of the screen by using the horizontal & vertical adjustment buttons.
- D. Place the probe on and off POS. B (clean fastener) of the calibration standard. Select the 'rotation' (phase) menu. Change the phase angle so that the lift-off signal on the screen moves from right to left and angles down slightly below horizontal (Figure 7). Center the probe over the fastener at POS. B (clean fastener) on the calibration standard and press the 'null' or 'balance' button. Lift the probe off the calibration standard. The display should be similar to Figure 7. The phase setting can vary from probe to probe and is somewhat dependent on operator preferences.
- E. Adjust the Vertical to Horizontal gain difference to 6 db minimum. A horizontal gain setting of H-Gain 65 db and vertical gain setting V-Gain 71 db was used during the development of this technique. Balance the instrument and clear the display. Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. B (clean fastener).
- F. Move the probe from POS. B (clean fastener) to POS. A (.270 in. EDM notch, complete breakout to edge of angle) on the calibration standard. Adjust the gain to position the signal from the POS. A fastener (EDM notch) to be at least three major vertical divisions (30% FSH) away from the balanced point. (See Figure 8). Note: when gain (dB) is added

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to the instrument always rebalance the probe on the calibration standard at POS. B (clean fastener) location.

- G. Turn to the 'alarm' menu. Adjust the alarm box to trigger on POS. A (.270 in. EDM notch, complete breakout to edge of angle). If instability of the alarm occurs, adjust the center or size of the alarm box. Note: The alarm box is not mandatory. The alarm helps the inspector identify cracked fastener sites by triggering a horn. If the horn sounds the inspector should verify that the alarm signal is not caused by an edge or sudden change in thickness of the skin (Figure 9). Now the eddy current instrument is set-up and working properly and the inspector is ready to inspect the aircraft.

6. Inspection Procedure

- A. Note: There are two different geometry situations that could shift the ring probe signal response so it would appear to the inspector that there is a problem with a particular fastener. Both situations could happen during the assembly of the wing spar to the skin and the angle stiffener. They both involve how straight the fastener holes are drilled along a centerline that should be 0.350" from the outer edge of the spar and angle stiffener. A fastener's position is obvious when compared to a line drawn thru the center of the dimples that are located on top of each fastener as shown in Figure 10.

Those fasteners that are above the centerline and closer to the outer edge, the signal response will move up above the null position. For those fasteners that are below the centerline and farther away from the outer edge, the signal response will move below the null position. The distance of the fastener from the centerline determines how far the signal response will be above or below the null position. **For both cases, when a crack is at one of those fasteners locations, the signal response should move 3 vertical divisions higher than fasteners with the same relative location (Figure 10).**

- B. Check the alignment of the fasteners to be inspected on the aircraft by drawing a line thru the center of the dimples that are located on top of each fastener as shown in Figure 10. Record the fasteners which are off-center on the corresponding Inspection Log sheet, pages 15 and 16. Place the ring probe over a fastener where the dimple is on the centerline and balance (null) the instrument on the aircraft. Verify that the alarm will not trigger during normal placement of the probe over the fasteners. Next, visually center the probe over each fastener and with the probe held firmly in place, monitor the signal response. There will be a slight +/- shift of the signal response for each fastener around the null point due to the ring probe centering error. Record the signal response for each fastener on the Inspection Log sheet for future comparisons.

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- C. Monitor the instrument response for all the inspection sites. The inspector should be able to clearly distinguish between the null and the signal response from a potential defect (3 divisions greater than null).

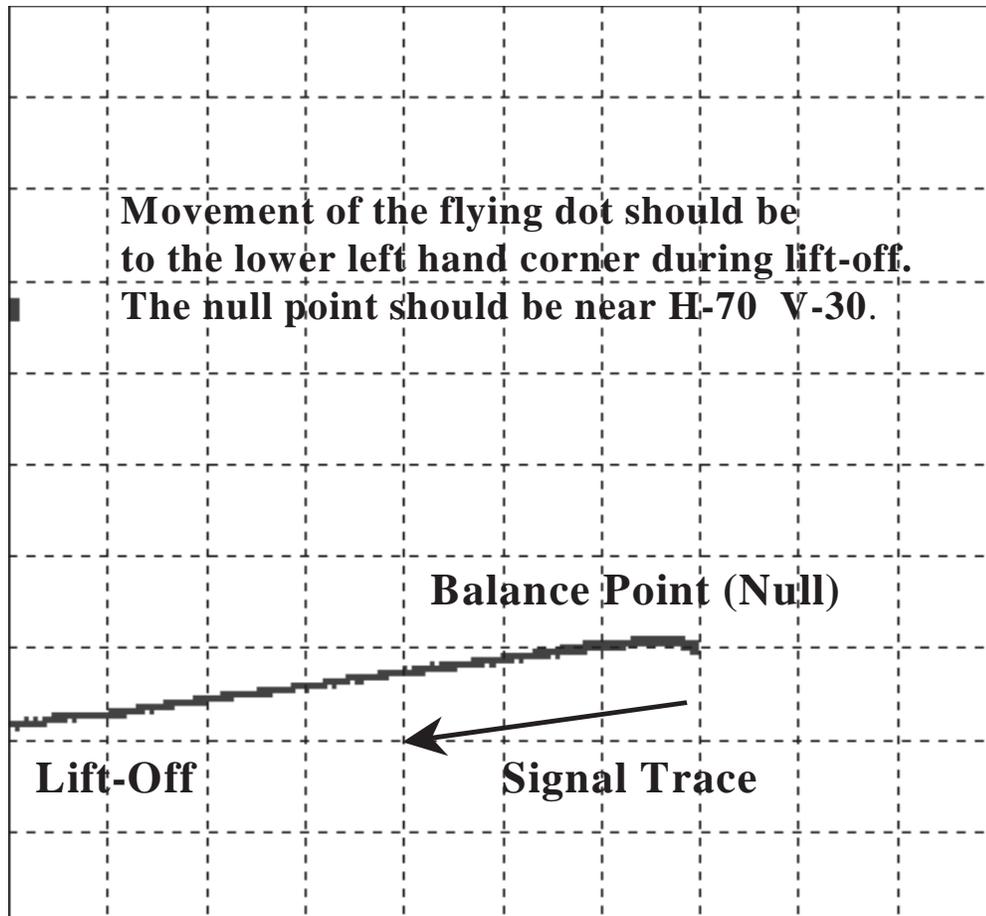
7. Signal Interpretation/Crack Evaluation

- A. As stated in the notes above there are two different geometry situations that could shift the ring probe signal response so it would appear to the inspector that there is a problem with a particular fastener. Regardless of this geometry shift once any fastener signal has moved three divisions up from the null it must be investigated further. This can be accomplished by gaining access to the inside of the wing and carrying out an edge scan of the spar and angle in accordance with Supplemental Inspection Number: 57-10-01 to verify the cause of the signal shift. If no crack is found, the fastener will be identified on the Inspection Log sheet with the amplitude of the signal noted. Subsequent inspections carried out on this fastener with the ring probe will monitor any further changes in the amplitude originally found and investigated. If any significant change is noted (3 divisions or greater), the edge surface scan of the spar and angle will need to be repeated to verify the integrity of the spar and angle. Update and record all findings on the Appendix A Inspection Log sheets. M7 Aerospace Service Engineering should be notified of all confirmed cracks. **All log sheets shall be kept for tracking purposes.**

8. Inspection Results

- A. Report all crack indications with the location specified on an Inspection Log sheet. Call M7 Aerospace Service Engineering for repair / rework instructions.

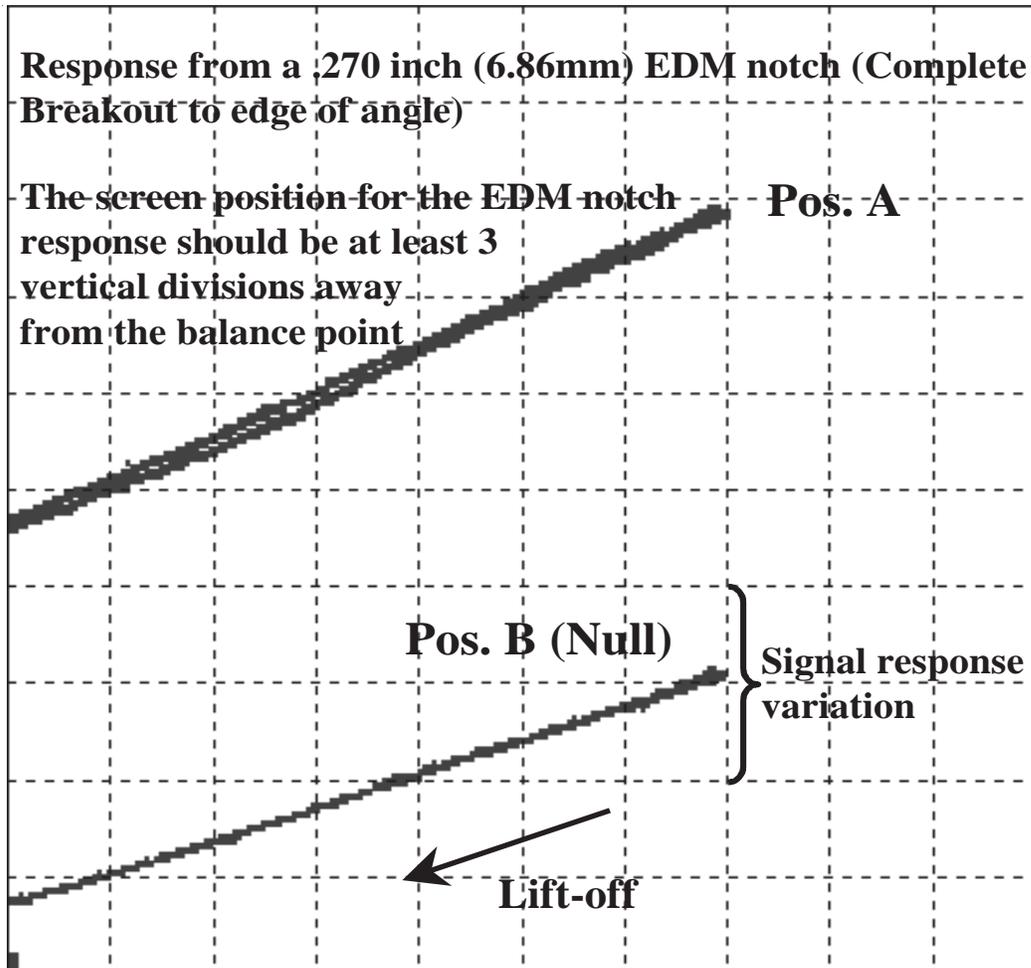
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MOVEMENT OF FLYING DOT TO THE LOWER LEFT HAND CORNER OF THE SCREEN AS PROBES MOVE FROM NULL POINT TO LIFT OFF

FIGURE 7

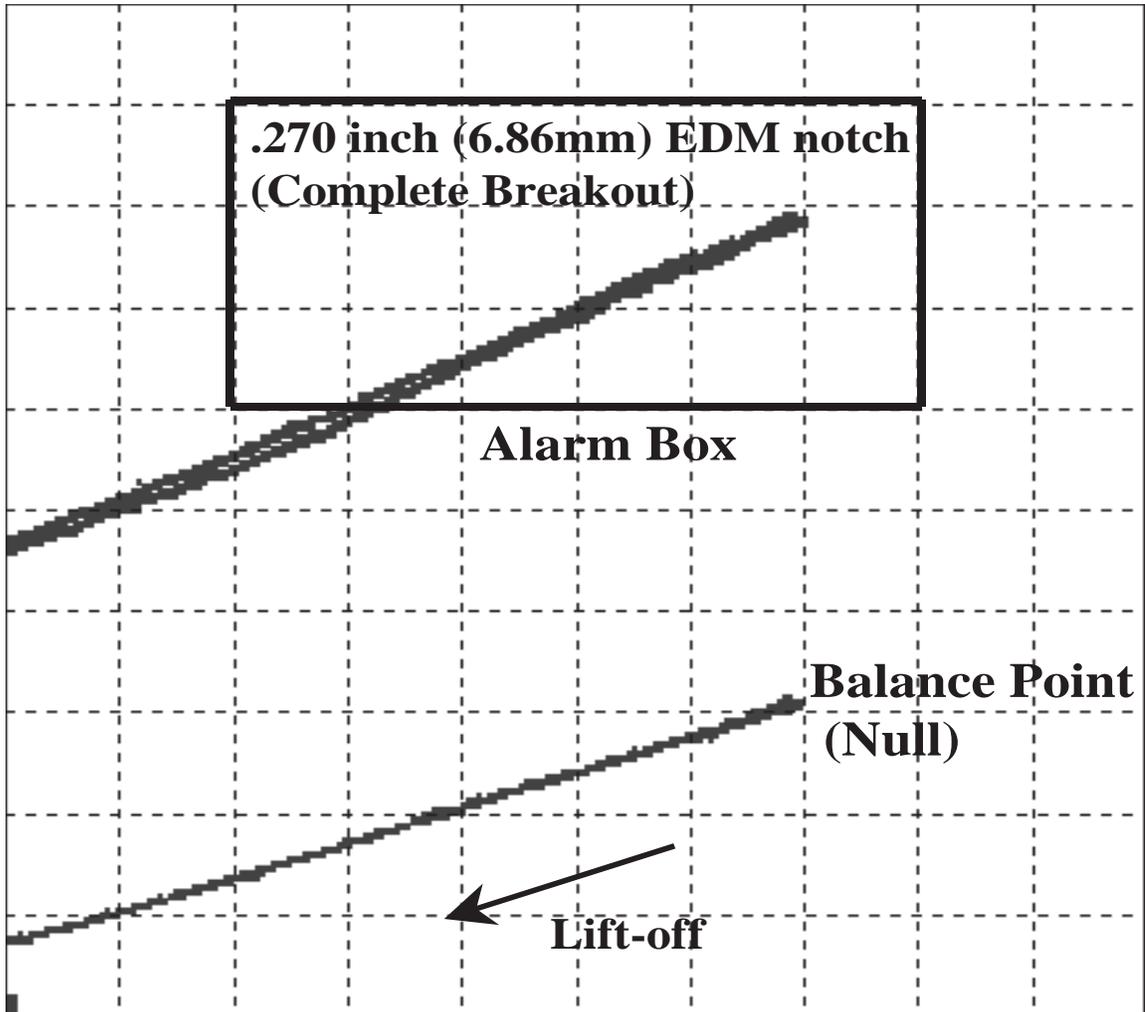
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TYPICAL RESPONSE FROM MS20426 FASTENER (POS. A & POS. B) ON THE CALIBRATION STANDARD

FIGURE 8

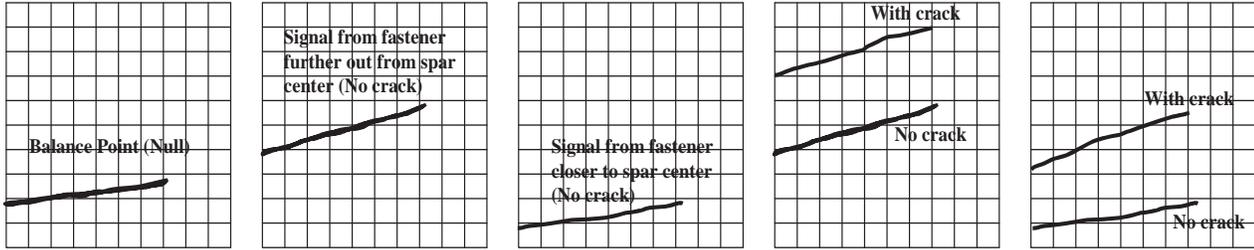
M7 AEROSPACE, LP
SA226 SERIES AIRCRAFT
SUPPLEMENTAL INSPECTION DOCUMENT
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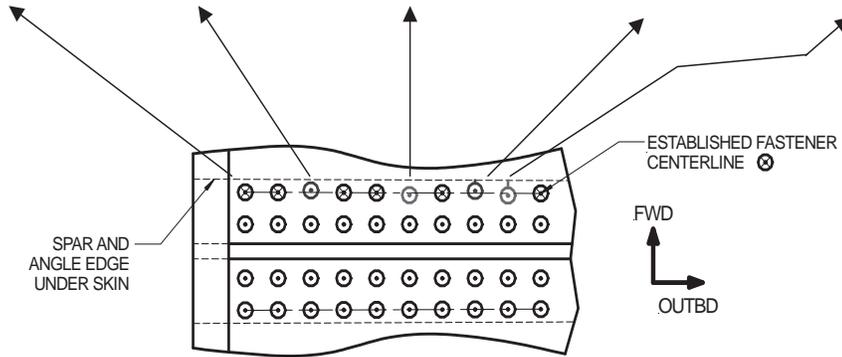
ALARM BOX APPLIED TO .270 INCH (6.86mm) EDM NOTCH (Complete Breakout)
(SA226, Pattern 1, MS20426 fastener, POS. A & POS. B)

FIGURE 9

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NULL OF FASTENER ON ESTABLISHED CENTERLINE SIGNAL FROM FASTENER OFFSET FROM ESTABLISHED CENTERLINE (CLOSER TO SPAR & ANGLE EDGE) SIGNAL FROM FASTENER OFFSET FROM ESTABLISHED CENTERLINE (FARTHER FROM SPAR & ANGLE EDGE) SIGNALS FROM FASTENERS CLOSER TO SPAR & ANGLE EDGE SIGNALS FROM FASTENERS FARTHER FROM SPAR & ANGLE EDGE



SA226 LOWER WING SPAR FASTENER PATTERN LEFT SIDE

SIGNAL RESPONSES FROM OFFSET FASTENER SITES

FIGURE 10

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Inspection Log Sheets**

<u>INSPECTION LOG SHEET</u>									
FASTENER SIGNALS									
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
10	9	8	7	6	5	4	3	2	1
●	●	●	●	●	●	●	●	●	●
○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○
●	●	●	●	●	●	●	●	●	●
20	19	18	17	16	15	14	13	12	11
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<div style="display: flex; justify-content: space-between; align-items: center; margin-top: 10px;"> <div style="text-align: center;"> <p>OUTBD</p> </div> <div style="text-align: center;"> <p>FWD</p> </div> </div>									
<u>SA226 LOWER WING SPAR FASTENER PATTERN RIGHT SIDE</u>									
AIRCRAFT SERIAL NO.: _____ FLIGHT HOURS: _____ INSPECTION COMPLETED BY: _____ DATE: _____ NULL ON FASTENER NO. : _____ FASTENER POSITION ON EC SCREEN : V: ____ H: ____ COMMENTS: _____ _____ _____ _____ _____ _____ _____ _____ _____									

**SAMPLE INSPECTION LOG SHEET FOR RIGHT SIDE
LOOKING UP**

**M7 AEROSPACE, LP
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SUPPLEMENTAL INSPECTION DOCUMENT
APPENDIX A**

<u>INSPECTION LOG SHEET</u>									
FASTENER SIGNALS									
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
●	●	●	●	●	●	●	●	●	●
○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○
●	●	●	●	●	●	●	●	●	●
.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;"> <p>OUTBD</p> </div> <div style="text-align: center;"> <p>FWD</p> </div> </div>									
<u>SA226 LOWER WING SPAR FASTENER PATTERN LEFT SIDE</u>									
AIRCRAFT SERIAL NO.: _____ FLIGHT HOURS: _____ INSPECTION COMPLETED BY: _____ DATE: _____ NULL ON FASTENER NO. : _____ FASTENER POSITION ON EC SCREEN : V: ____ H: ____ COMMENTS: _____ _____ _____ _____ _____ _____ _____ _____ _____									

**SAMPLE INSPECTION LOG SHEET FOR LEFT SIDE
LOOKING UP**

**M7 AEROSPACE, LP
SA226 SERIES AIRCRAFT
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<u>INSPECTION LOG SHEET</u>									
FASTENER SIGNALS									
NULL	.+1	.+4	NULL	NULL	NULL	NULL	NULL	.-1	NULL
.1	.2	.3	.4	.5	.6	.7	.8	.9	.10
●	●	●	●	●	●	●	●	●	●
○	○	○	○	○	○	○	○	○	○
○	○	○	○	○	○	○	○	○	○
●	●	●	●	●	●	●	●	●	●
.11	.12	.13	.14	.15	.16	.17	.18	.19	.20
.-2	NULL	NULL	.+3	NULL	NULL	.+1	NULL	NULL	.+2

OUTBD →

↑ FWD

AIRCRAFT SERIAL NO.:
BB222

FLIGHT HOURS:
30.050

INSPECTION COMPLETED BY:
M. SMITH

DATE:
6-30-02

NULL ON FASTENER NO. :
8

FASTENER POSITION
ON EC SCREEN :
V: 3 H: 7

COMMENTS:
RIVET 3 HAD A 4 DIVISION
INDICATION ABOVE NULL.
INVESTIGATED WITH
INTERNAL SURFACE SCAN
OF THE SPAR AND ANGLE
EDGE. NO INDICATION OF
CRACK. RIVET IS OFFSET
FROM CENTERLINE AND
IS CLOSER TO EDGE
OF SPAR.

SA226 LOWER WING SPAR FASTENER PATTERN LEFT SIDE

TYPICAL COMPLETED INSPECTION LOG SHEET

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INTENTIONALLY LEFT BLANK

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APPENDIX B

Inspection Procedure to Detect Cracks in the
SA227 Wing Spar Lower Cap
for Metro-Fairchild Aircraft
Using Low Frequency Eddy Current

1. Purpose

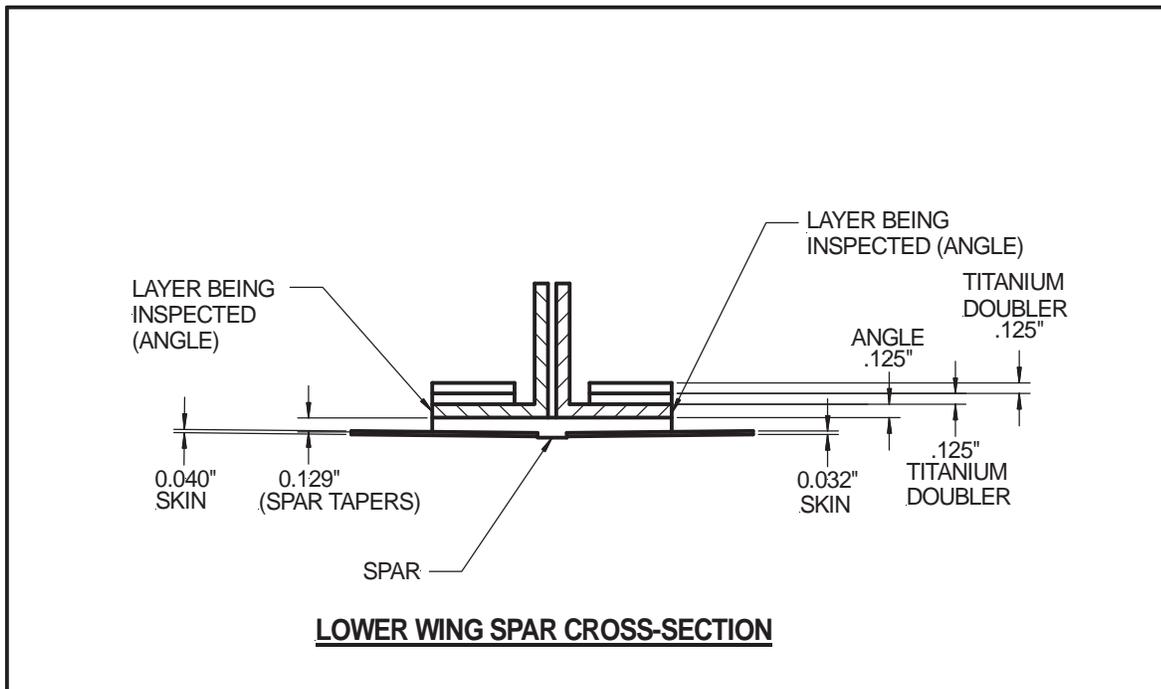
The purpose of this inspection is to detect fatigue cracks at fastener sites in the third layer of material (the fwd and aft angles) in the main wing spar lower cap. This procedure uses an impedance plane eddy current instrument and a low frequency eddy current “ring” probe.

Note: It is recommended that the inspector using this procedure be experienced and well founded in the fundamentals of eddy current testing. Inspectors should fully possess the qualification of eddy current testing personnel as defined in Recommended Practice No. SNT-TC-1A, Personnel Qualification and Certification in Nondestructive Testing, available from ASNT (American Society for Nondestructive Testing) or equivalent.

2. Overview of Aircraft Structure

The area of inspection (lower wing spar) consists of several layers of material. The main concern is the angle stiffeners as shown in Figure 1. The inspection area specified in the SID (Supplemental Inspection Document) is from W.S. 96 to W.S. 111. The inspection area using this technique is from W.S. 104.71 (1st fastener outbd of nacelle flange) to W.S. 133. The inspection area is situated adjacent to the engine nacelle as shown in Figure 2. The first fastener outboard of the nacelle flange is where the inspection begins (see “First Inspectable Rivet” label in Figure 2) and continues to station 133. The outside fastener rows are required to be inspected along with the fasteners in a single row. The area inside the nacelle (W.S. 96 to W.S. 104) cannot be inspected using this technique. The fastener patterns and fastener types may also vary on this aircraft model so special care must be taken to insure that the pattern and fastener type in the inspection area matches the configuration shown in Figures 3-5. If none of the configurations match the aircraft being inspected, do not continue with this inspection method. You should contact M7 Aerospace Service Engineering at (210) 824-9421, Ext 7663. Inconsistent inspection results can occur if the fastener type on the aircraft does not match the one on the calibration standard. Figure 6 shows the three different fasteners used in the area of the inspection. The first type is an aluminum rivet (MS20426, Type BB5), which has a 100-degree countersink. The second is a blind steel fastener (MS90353), which has a 100-degree countersink and will also have a raised portion in the center of the fastener where the serrated pin is broken off at installation. The third type of fastener (NAS 7026) is steel, has a 100-degree countersink, and is a little smaller in diameter (head) than the MS90353 fastener and is flush on the top surface. All of these fastener types are located on the appropriate calibration standard.

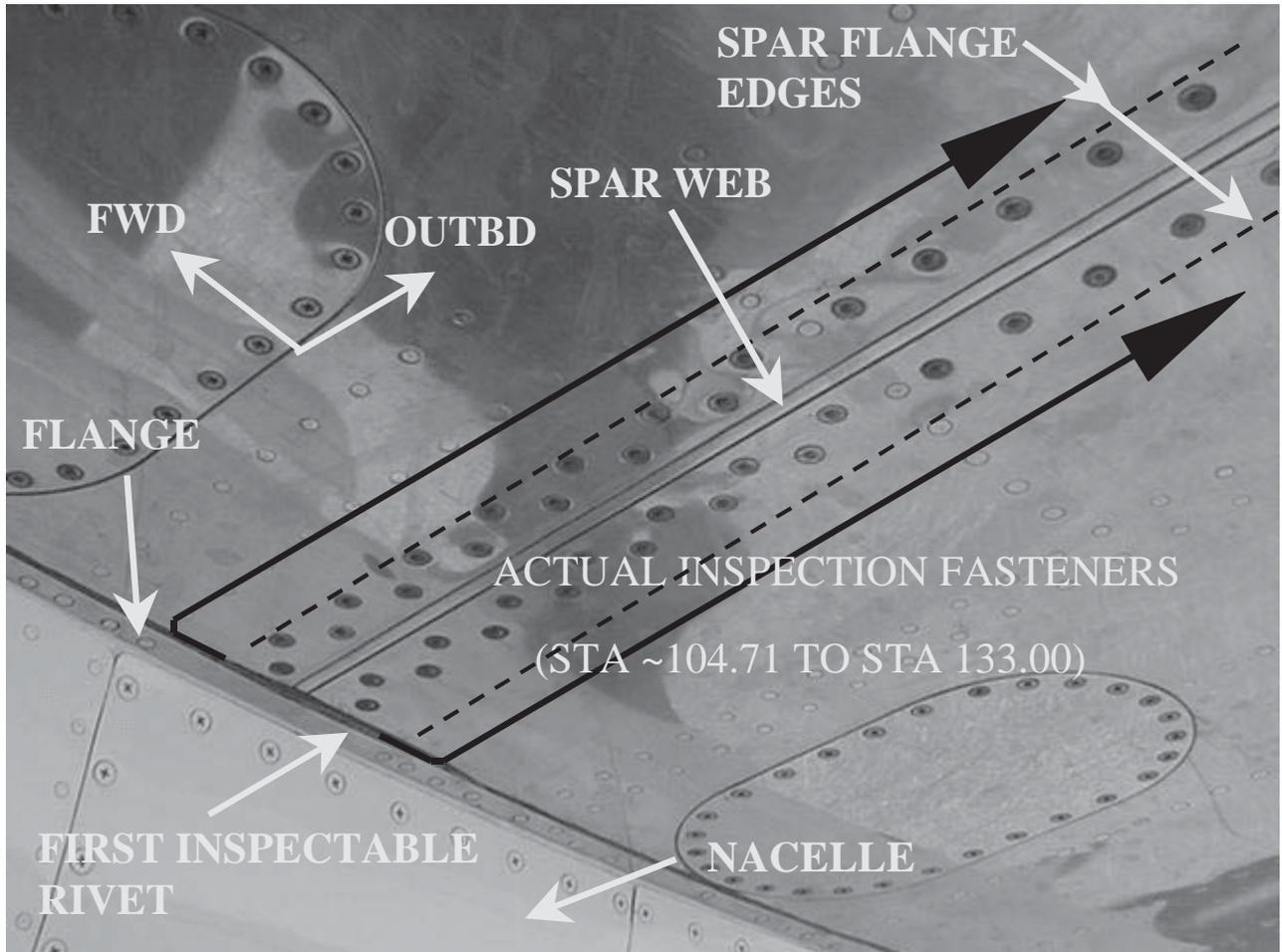
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LOWER WING SPAR CROSS-SECTION

FIGURE 1

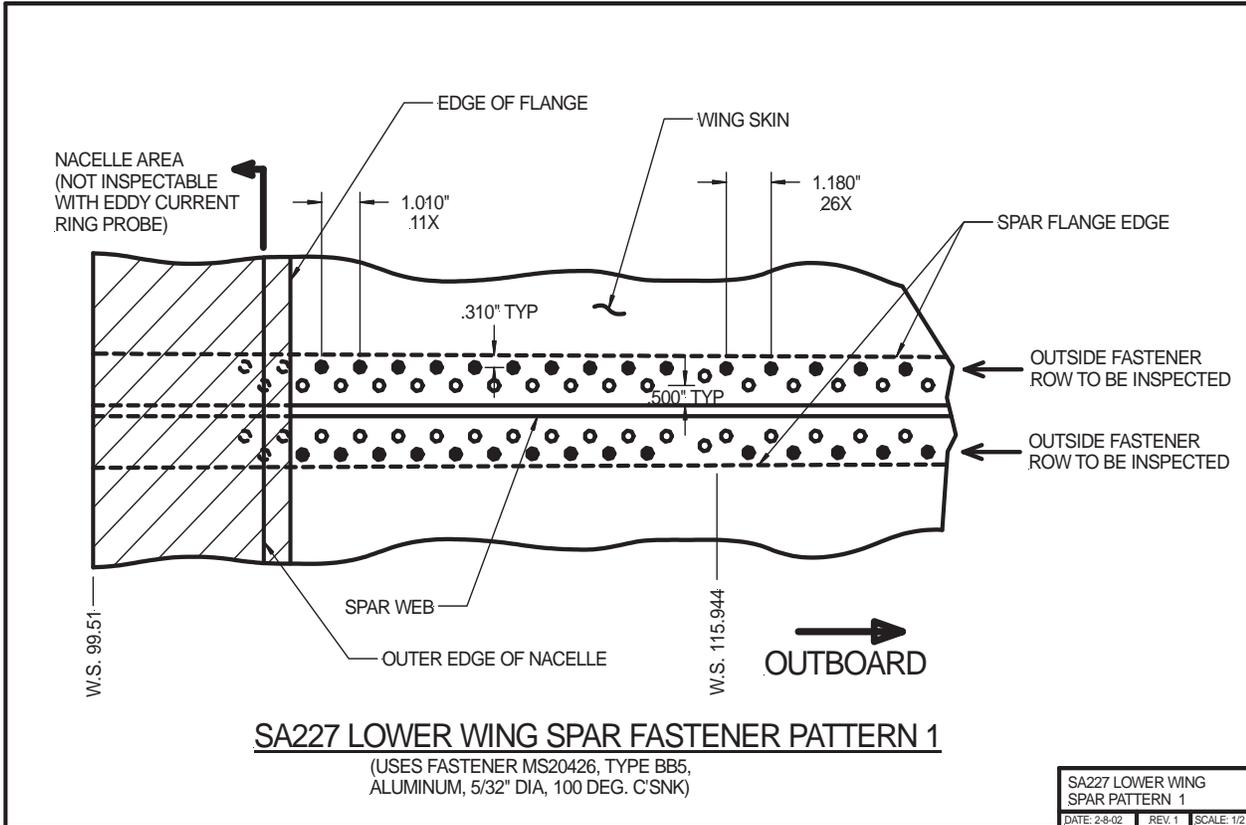
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SA227 LEFT SIDE WING INSPECTION AREA
(Fastener Pattern 1)

FIGURE 2

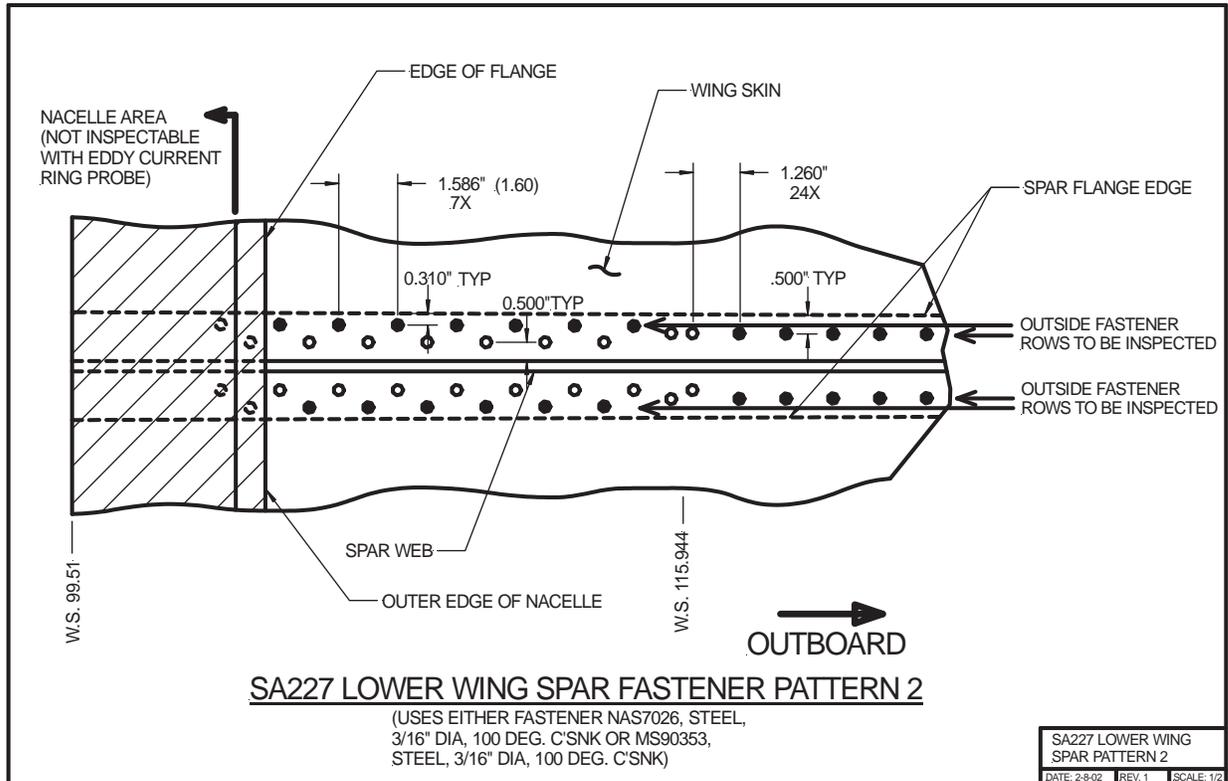
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SA227 LOWER WING SPAR FASTENER PATTERN 1
 (View from underside of wing)

FIGURE 3

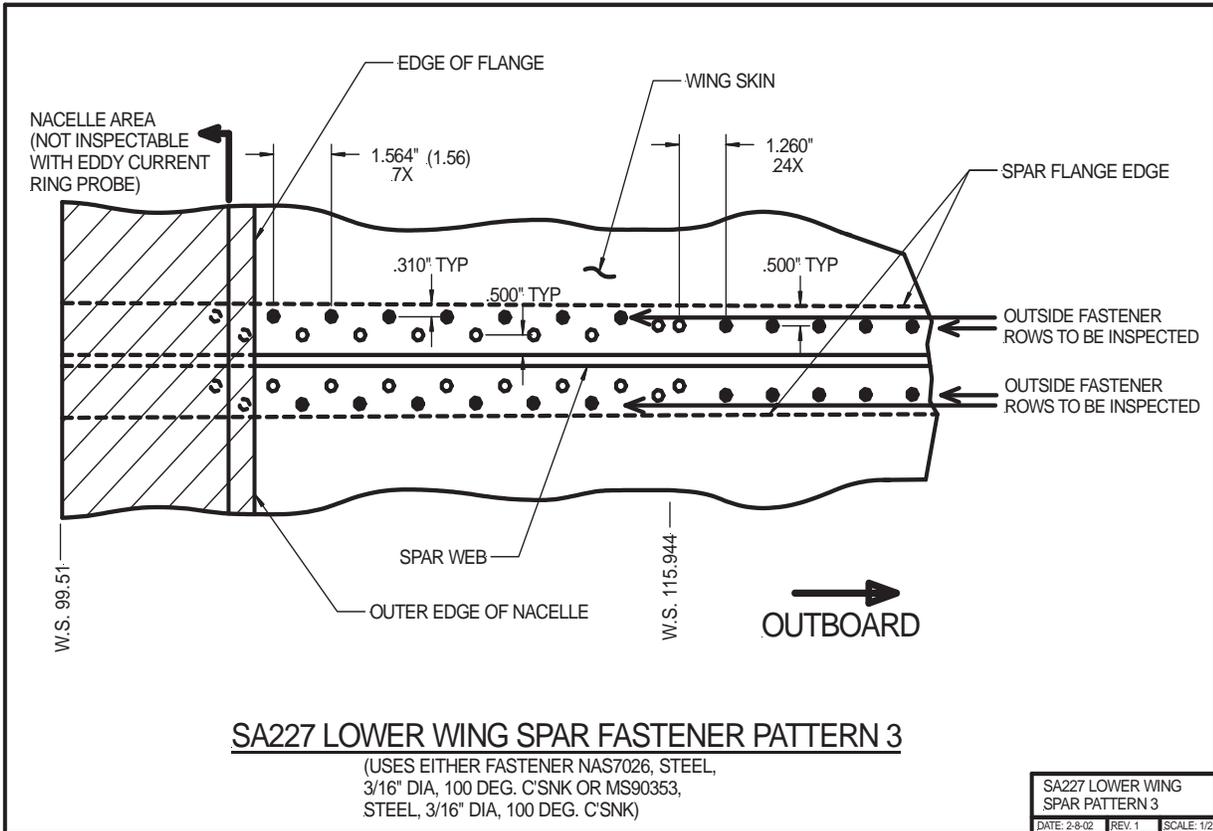
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SA227 LOWER WING SPAR FASTENER PATTERN 2
(View from underside of wing)

FIGURE 4

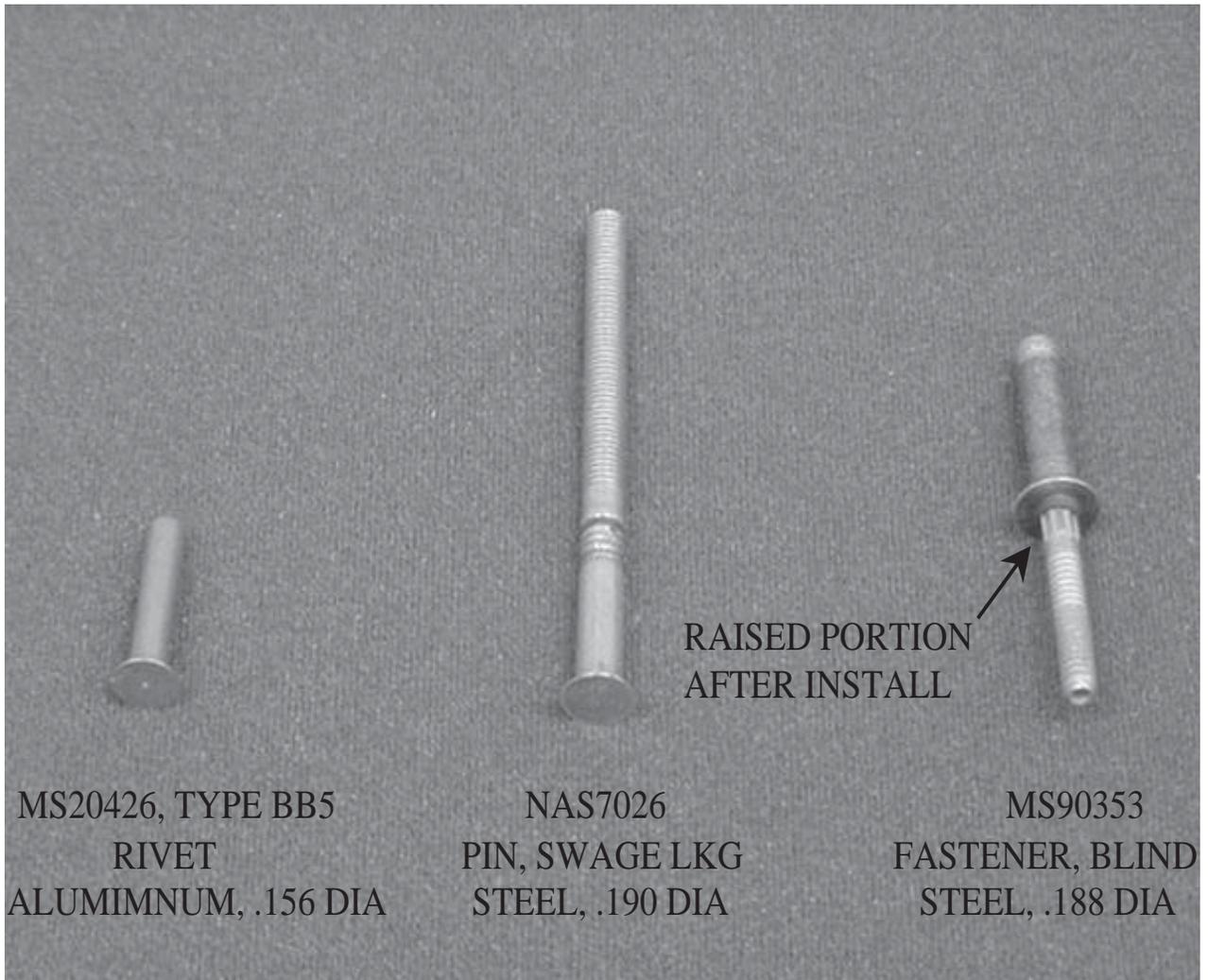
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SA227 LOWER WING SPAR FASTENER PATTERN 3

FIGURE 5

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FASTENER TYPES

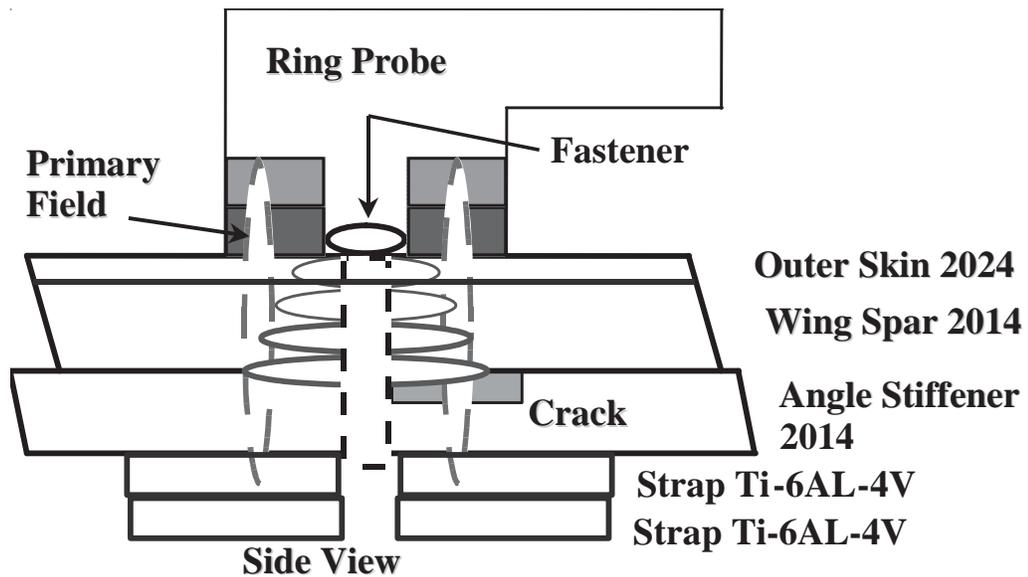
FIGURE 6

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3. Equipment

- A. A portable impedance plane eddy current instrument with digital storage display. The equipment used to develop this procedure was Staveley Instruments model Nortec 19 ell, 1000S, 2000D and Zetec MIZ-22.
- B. There are two different probes required depending on the fastener material. For the aluminum rivets, an eddy current reflectance probe with a 100 Hz to 5 kHz frequency and an outside diameter no greater than 0.75-in. (19.05-mm) is required (Figure 7). The probe used to develop this procedure for the aluminum rivets was manufactured by Staveley, NECP-1037 reflectance probe inside diameter (ID) 0.33-in. (8.38-mm) and outside diameter (OD) 0.75-in. (19.05-mm) operating between 100 Hz and 5 kHz. For both steel fastener types, an eddy current reflectance probe with a 100 Hz – 10 kHz frequency and an outside diameter no greater than 1.00-in. (25.4-mm) (Figure 7). The probe used to develop this procedure for the steel fasteners was manufactured by Staveley, RR/100 Hz-10 kHz reflectance probe inside diameter (ID) 0.33-in. (8.38-mm) and outside diameter (OD) 1.00-in. (25.4-mm) operating between 100 Hz – 10kHz.
- C. Figures 8 & 9 show the specific design parameters on the SA227 aircraft calibration standards. **Special attention should be taken to ensure calibration is being completed on the appropriate standard with the same fastener pattern and fastener type as the aircraft being inspected.** The calibration standards (Figures 8 & 9) are made of 2024 aluminum (outer skin) 1.016-mm (0.040-in), 2014 aluminum (wing spar), aluminum 2014 angle stiffener, and titanium (Ti-6AL-4V) strap. Note: The aircraft can have two different skin thicknesses (0.040" and 0.032") in the inspection area, the 0.040" skin was selected for these calibration standards and is suitable to use for the .032" skin inspections. There are three different types of fasteners used on the calibration standards (MS20426, MS90353 & NAS7026). The aluminum standard should be smooth and free of dirt before starting calibration. Verification of the design features on the calibration standards described above should be included with the calibration standards. An inspection report should include the size and location of the holes and EDM notch widths and lengths. A copy of the inspection report should stay with the calibration standards.

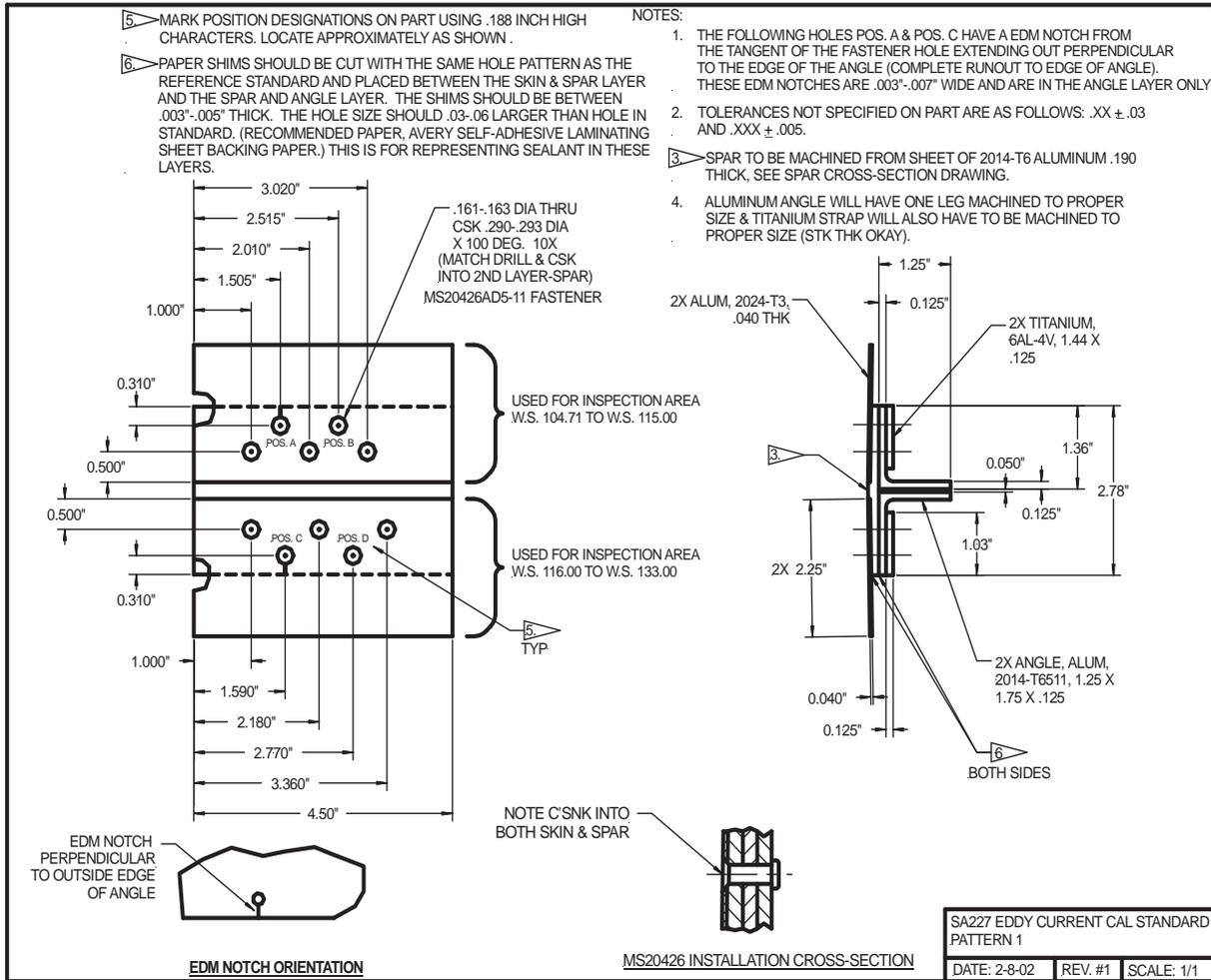
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EDDY CURRENT RING PROBE SET-UP OVER FASTENER AND MATERIAL CROSS-SECTION

FIGURE 7

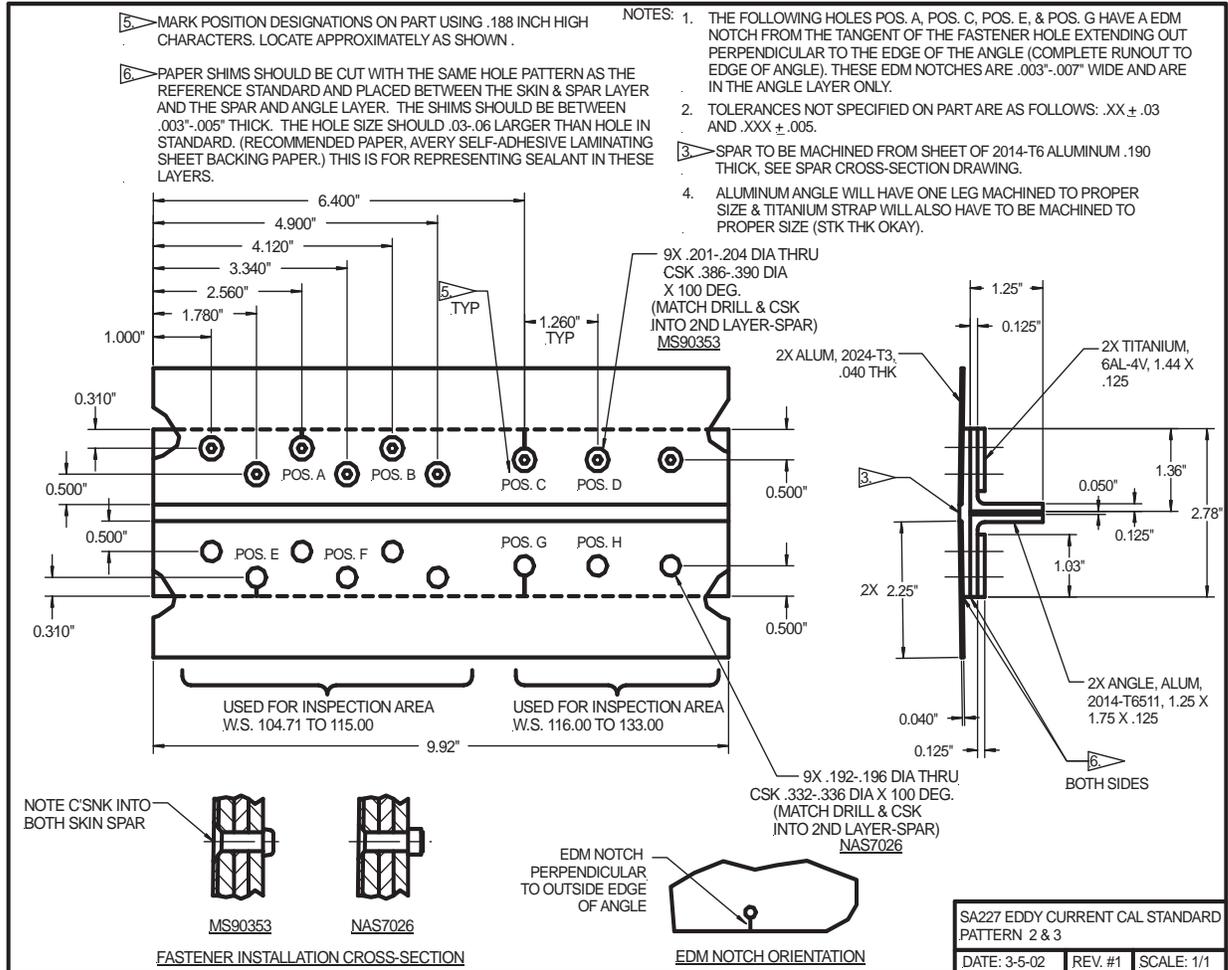
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CALIBRATION STANDARD FOR SA227 LWS (Lower Wing Spar)
FASTENER PATTERN 1

FIGURE 8

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CALIBRATION STANDARD FOR SA227 LWS
FASTENER PATTERNS 2 & 3

FIGURE 9

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4. Inspection Surface Preparation

- A. If the surface has irregularities such as grease, corrosion, or scale, clean the surface to obtain a smooth working surface. Removal of surface irregularities will enhance the accuracy of this inspection technique. Note: Paint removal is not required as long as the inspection surface is smooth. If paint is present on the lower wing spar of the aircraft to be inspected add a piece of .003" - .005" thick Teflon tape to the calibration standard before calibration.
- B. Before starting calibration be sure the calibration standard being used matches the fastener pattern (same fastener spacing) and fastener type of the aircraft being inspected.

5. Instrument Calibration Lower Wing Spar SA227 Fastener Pattern 1

- A. Turn the instrument power on and check the battery charge status. The instrument should have at least 80% of available battery capacity (Battery Voltage Maximum times 20%). The screen brightness and contrast of the display screen should match the environmental conditions (i.e., outside sunlight or inside a hangar).
- B. Depending on the eddy current instrument used, select or verify the 'reflection probe' setting from the probe selection menu. Connect the cable to the proper connector location. Set the frequency to 600 Hz. This procedure was developed using 600 Hz.
- C. For the inspection area from W.S. 104.71 to W.S. 115 position the eddy current probe at POS. B (clean fastener) on the calibration standard, reference (Figure 8). **It is important to center the probe over each fastener during the calibration and inspection. If the probe is located off center it could cause a signal response that could be misinterpreted for a flaw.** Press the 'null' or 'balance' button. Lift the probe off the calibration standard. Observe the signals on the screen. Change the position of the nulled dot to the lower right of the screen by using the horizontal & vertical adjustment buttons.
- D. Place the probe on and off POS. B (clean fastener) of the calibration standard. Select the 'rotation' (phase) menu. Change the phase angle so that the lift-off signal on the screen moves from right to left and angles down slightly below horizontal (Figure 10). Center the probe over the fastener at POS. B (clean fastener) on the calibration standard and press the 'null' or 'balance' button. Lift the probe off the calibration standard. The display should be similar to Figure 10. The phase setting can vary from probe to probe and is somewhat dependent on operator preferences.
- E. Adjust the Vertical to Horizontal gain difference to 6 db minimum. A horizontal gain setting of H-Gain 65 db and vertical gain setting V-Gain 71 db was used during the

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development of this technique. Balance the instrument and clear the display. Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. B (clean fastener).

- F. Move the probe from POS. B (clean fastener) to POS. A (.230 in. EDM notch, complete breakout to edge of angle) on the calibration standard. Adjust the gain to position the signal from the EDM notch to be at least three major vertical divisions (30% FSH) away from the balanced point (See Figure 11). Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. B (clean fastener) location.
- G. Turn to the 'alarm' menu. Adjust the alarm box to trigger on POS. A (.230 in. EDM notch, complete breakout to edge of angle). If instability of the alarm occurs, adjust the center or size of the alarm box. Note: The alarm box is not mandatory. The alarm helps the inspector identify cracked fastener sites by triggering a horn. If the horn sounds the inspector should verify that the alarm signal is not caused by an edge or sudden change in thickness of the skin (Figure 12). Now the eddy current instrument is set-up and working properly and the inspector is ready to inspect the aircraft.
- H. For the inspection area from W.S. 116.00 to W.S. 133.00 repeat steps C through G using Position D for the clean fastener and Position C for the flawed fastener (Figure 8).

6. Instrument Calibration Lower Wing Spar SA227 Pattern 2 & 3 Fastener MS90353

- A. Turn the instrument power on and check the battery charge status. The instrument should have at least 80% of available battery capacity (Battery Voltage Maximum times 20%). The screen brightness and contrast of the display screen should match the environmental conditions (i.e., outside sunlight or inside a hangar).
- B. Depending on the eddy current instrument used, select or verify the 'reflection probe' setting from the probe selection menu. Connect the cable to the proper connector location. Set the frequency to 300 Hz. This procedure was developed using 300 Hz.
- C. For the inspection area from W.S. 104.71 to W.S. 115.00 position the eddy current probe at POS. B (clean fastener) on the calibration standard, reference (Figure 9). **It is important to center the probe over each fastener during the calibration and inspection. If the probe is located off center it could cause a signal response that could be misinterpreted for a flaw.** Press the 'null' or 'balance' button. Lift the probe off the calibration standard. Observe the signals on the screen. Change the position of the nulled dot to the lower right of the screen by using the horizontal & vertical adjustment buttons.

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- D. Place the probe on and off POS. B (clean fastener) of the calibration standard. Select the 'rotation' (phase) menu. Change the phase angle so that the lift-off signal on the screen moves from right to left and angles down slightly below horizontal (Figure 10). Center the probe over the fastener at POS. B (clean fastener) on the calibration standard and press the 'null' or 'balance' button. Lift the probe off the calibration standard. The display should be similar to Figure 10. The phase setting can vary from probe to probe and is somewhat dependent on operator preferences.
- E. A horizontal gain setting of H-Gain 59 db and vertical gain setting V-Gain 60 db was used during the development of this technique. Balance the instrument and clear the display. Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. B (clean fastener).
- F. Move the probe from POS. B (clean fastener) to POS. A (.210 in. EDM notch, complete breakout to edge of angle) on the calibration standard. Adjust the gain to position the signal from the EDM notch to be at least three major vertical divisions (30% FSH) away from the balanced point (See Figure 13). Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. B (clean fastener) location.
- G. Turn to the 'alarm' menu. Adjust the alarm box to trigger on POS. A (.210 in. EDM notch, complete breakout to edge of angle). If instability of the alarm occurs, adjust the center or size of the alarm box. Note: The alarm box is not mandatory. The alarm helps the inspector identify cracked fastener sites by triggering a horn. If the horn sounds the inspector should verify that the alarm signal is not caused by an edge or sudden change in thickness of the skin (Figure 14). Now the eddy current instrument is set-up and working properly and the inspector is ready to inspect the aircraft.
- H. For the inspection area from W.S. 116.00 to W.S. 133.00 position the eddy current probe at POS. D (clean fastener) on the calibration standard, reference (Figure 9). **It is important to center the probe over each fastener during the calibration and inspection. If the probe is located off center it could cause a signal response that could be misinterpreted for a flaw.** Press the 'null' or 'balance' button. Lift the probe off the calibration standard. Observe the signals on the screen. Change the position of the nulled dot to the lower right of the screen by using the horizontal & vertical adjustment buttons.
- I. Place the probe on and off POS. D (clean fastener) of the calibration standard. Select the 'rotation' (phase) menu. Change the phase angle so that the lift-off signal on the screen moves from right to left and angles down slightly below horizontal (Figure 10). Center the probe over the fastener at POS. D (clean fastener) on the calibration standard and press the 'null' or 'balance' button. Lift the probe off the calibration standard. The

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display should be similar to Figure 10. The phase setting can vary from probe to probe and is somewhat dependent on operator preferences.

- J. A horizontal gain setting of H-Gain 59 db and vertical gain setting V-Gain 60 db was used during the development of this technique. Balance the instrument and clear the display. Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. D (clean fastener).
- K. Move the probe from POS. D (clean fastener) to POS. C (.400 in. EDM notch, complete breakout to edge of angle) on the calibration standard. Adjust the gain to position the signal from the EDM notch to be at least three major vertical divisions (30% FSH) away from the balanced point (See Figure 15).

Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. D (clean fastener) location.

- L. Turn to the 'alarm' menu. Adjust the alarm box to trigger on POS. C (.400 in. EDM notch, complete breakout to edge of angle). If instability of the alarm occurs, adjust the center or size of the alarm box. Note: The alarm box is not mandatory. The alarm helps the inspector identify cracked fastener sites by triggering a horn. If the horn sounds the inspector should verify that the alarm signal is not caused by an edge or sudden change in thickness of the skin (Figure 16). Now the eddy current instrument is set-up and working properly and the inspector is ready to inspect the aircraft.

7. Instrument Calibration Lower Wing Spar SA227 Pattern 2 & 3 Fastener NAS7026

- A. Turn the instrument power on and check the battery charge status. The instrument should have at least 80% of available battery capacity (Battery Voltage Maximum times 20%). The screen brightness and contrast of the display screen should match the environmental conditions (i.e., outside sunlight or inside a hangar).
- B. Depending on the eddy current instrument used, select or verify the 'reflection probe' setting from the probe selection menu. Connect the cable to the proper connector location. Set the frequency to 300 Hz. This procedure was developed using 300 Hz.
- C. For the inspection area from W.S. 104.71 to W.S. 115.00 position the eddy current probe at POS. F (clean fastener) on the calibration standard, reference (Figure 9). **It is important to center the probe over each fastener during the calibration and inspection. If the probe is located off center it could cause a signal response that could be misinterpreted for a flaw.** Press the 'null' or 'balance' button. Lift the probe off the calibration standard. Observe the signals on the screen. Change the position of the nulled dot to the lower right of the screen by using the horizontal & vertical adjustment buttons.

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- D. Place the probe on and off POS. F (clean fastener) of the calibration standard. Select the 'rotation' (phase) menu. Change the phase angle so that the lift-off signal on the screen moves from right to left and angles down slightly below horizontal (Figure 10). Center the probe over the fastener at POS. F (clean fastener) on the calibration standard and press the 'null' or 'balance' button. Lift the probe off the calibration standard. The display should be similar to Figure 10. The phase setting can vary from probe to probe and is somewhat dependent on operator preferences.
- E. A horizontal gain setting of H-Gain 59 db and vertical gain setting V-Gain 60 db was used during the development of this technique. Balance the instrument and clear the display. Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. F (clean fastener).
- F. Move the probe from POS. F (clean fastener) to POS. E (.215 in. EDM notch, complete breakout to edge of angle) on the calibration standard. Adjust the gain to position the signal from the EDM notch to be at least three major vertical divisions (30% FSH) away from the balanced point (See Figure 17). Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. F (clean fastener) location.
- G. Turn to the 'alarm' menu. Adjust the alarm box to trigger on POS. E (.215 in. EDM notch, complete breakout to edge of angle). If instability of the alarm occurs, adjust the center or size of the alarm box. Note: The alarm box is not mandatory. The alarm helps the inspector identify cracked fastener sites by triggering a horn. If the horn sounds the inspector should verify that the alarm signal is not caused by an edge or sudden change in thickness of the skin (Figure18). Now the eddy current instrument is set-up and working properly and the inspector is ready to inspect the aircraft.
- H. For the inspection area from W.S. 116.00 to W.S. 133.00 position the eddy current probe at POS. H (clean fastener) on the calibration standard, reference (Figure 9). **It is important to center the probe over each fastener during the calibration and inspection. If the probe is located off center it could cause a signal response that could be misinterpreted for a flaw.** Press the 'null' or 'balance' button. Lift the probe off the calibration standard. Observe the signals on the screen. Change the position of the nulled dot to the lower right of the screen by using the horizontal & vertical adjustment buttons.
- I. Place the probe on and off POS. H (clean fastener) of the calibration standard. Select the 'rotation' (phase) menu. Change the phase angle so that the lift-off signal on the screen moves from right to left and angles down slightly below horizontal (Figure 10).

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APPENDIX B

Center the probe over the fastener at POS. H (clean fastener) on the calibration standard and press the 'null' or 'balance' button. Lift the probe off the calibration standard. The display should be similar to Figure 10. The phase settings can vary from probe to probe and are somewhat dependent on operator preferences.

- J. A horizontal gain setting of H-Gain 59 db and vertical gain setting V-Gain 60 db was used during the development of this technique. Balance the instrument and clear the display. Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. H (clean fastener).
- K. Move the probe from POS. H (clean fastener) to POS. G (.400 in. EDM notch, complete breakout to edge of angle) on the calibration standard. Adjust the gain to position the signal from the EDM notch to be at least three major vertical divisions (30% FSH) away from the balanced point (See Figure 19). Note: when gain (dB) is added to the instrument always rebalance the probe on the calibration standard at POS. H (clean fastener) location.
- L. Turn to the 'alarm' menu. Adjust the alarm box to trigger on POS. G (.400 in. EDM notch, complete breakout to edge of angle). If instability of the alarm occurs, adjust the center or size of the alarm box. Note: The alarm box is not mandatory. The alarm helps the inspector identify cracked fastener sites by triggering a horn. If the horn sounds the inspector should verify that the alarm signal is not caused by an edge or sudden change in thickness of the skin (Figure 20). Now the eddy current instrument is set-up and working properly and the inspector is ready to inspect the aircraft.

8. Inspection Procedure

- A. Note: There are two different geometry situations for each fastener pattern that could shift the ring probe signal response so it would appear to the inspector that there is a problem with a particular fastener. Both situations could happen during the assembly of the wing spar to the skin and the angle stiffener. They both involve how straight the fastener holes are drilled along a centerline that should be the same distance from the center of each fastener to the outer edge of the spar and angle stiffener. A fastener's position is obvious when compared to a line drawn thru the center of each fastener as shown in Figure 21. Those fasteners that are above the centerline and closer to the outer edge, the signal response will move up above the null position. For those fasteners that are below the centerline and farther away from the outer edge, the signal response will move below the null position. The distance of the fastener from the centerline determines how far the signal response will be above or below the null position. **For both cases, when a crack is at one of those fasteners locations, the signal response should move 3 vertical divisions higher than fasteners with the same relative location (Figure 21).**

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- B. Check the alignment of the fasteners to be inspected on the aircraft by drawing a line thru the center of each fastener as shown in Figure 21. Record the fasteners which are off-center on the corresponding Inspection Log sheet, Appendix B. Place the ring probe over a fastener that is on the centerline and balance (null) the instrument on the aircraft. Verify that the alarm will not trigger during normal placement of the probe over the fasteners. Next, visually center the probe over each fastener and with the probe held firmly in place, monitor the signal response. There will be a slight +/- shift of the signal response for each fastener around the null point due to the ring probe centering error. Record the signal response for each fastener on the Inspection Log sheet in Appendix B for future comparisons.
- C. Monitor the instrument response for all the inspection sites. The inspector should be able to clearly distinguish between the null and the signal response from a potential defect (3 divisions greater than null).

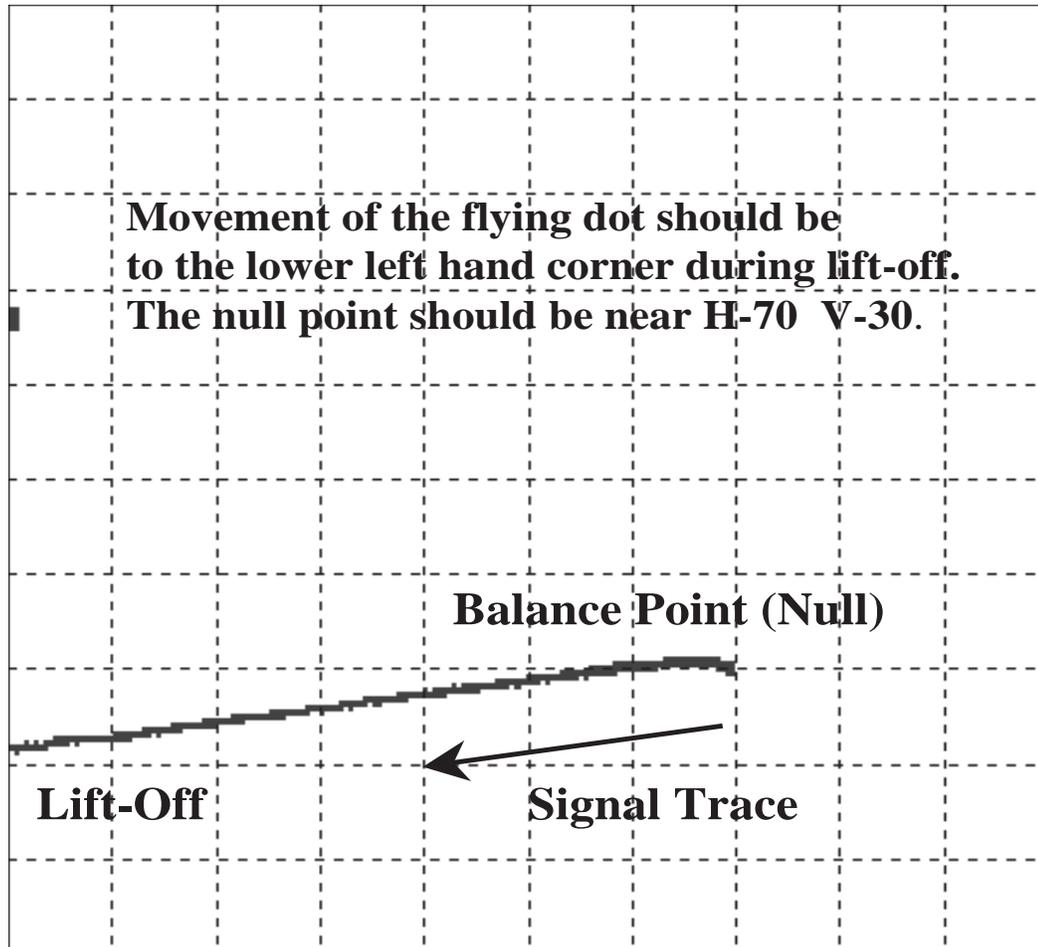
9. Signal Interpretation/Crack Evaluation

- A. As stated in the notes above there are two different geometry situations for each fastener pattern that could shift the ring probe signal response so it would appear to the inspector that there is a problem with a particular fastener. Regardless of this geometry shift once any fastener signal has moved three divisions up from the null it must be investigated further. This can be accomplished by gaining access to the inside of the wing and carrying out an edge scan of the spar and angle in accordance with Supplemental Inspection Number: 57-10-01 to verify the cause of the signal shift. If no crack is found, the fastener will be identified on the Inspection Log sheet with the amplitude of the signal noted. Subsequent inspections carried out on this fastener with the ring probe will monitor any further changes in the amplitude originally found and investigated. If any significant change is noted (3 divisions or greater), the edge surface scan of the spar and angle will need to be repeated to verify the integrity of the spar and angle. Update and record all findings on the Inspection Log sheets. M7 Aerospace should be notified of all confirmed cracks. **All log sheets shall be kept for tracking purposes.**

10. Inspection Results

- A. Report all crack indications with location specified on an Inspection Log Sheet. Call M7 Aerospace Service Engineering for further repair / rework instructions should cracks be found.

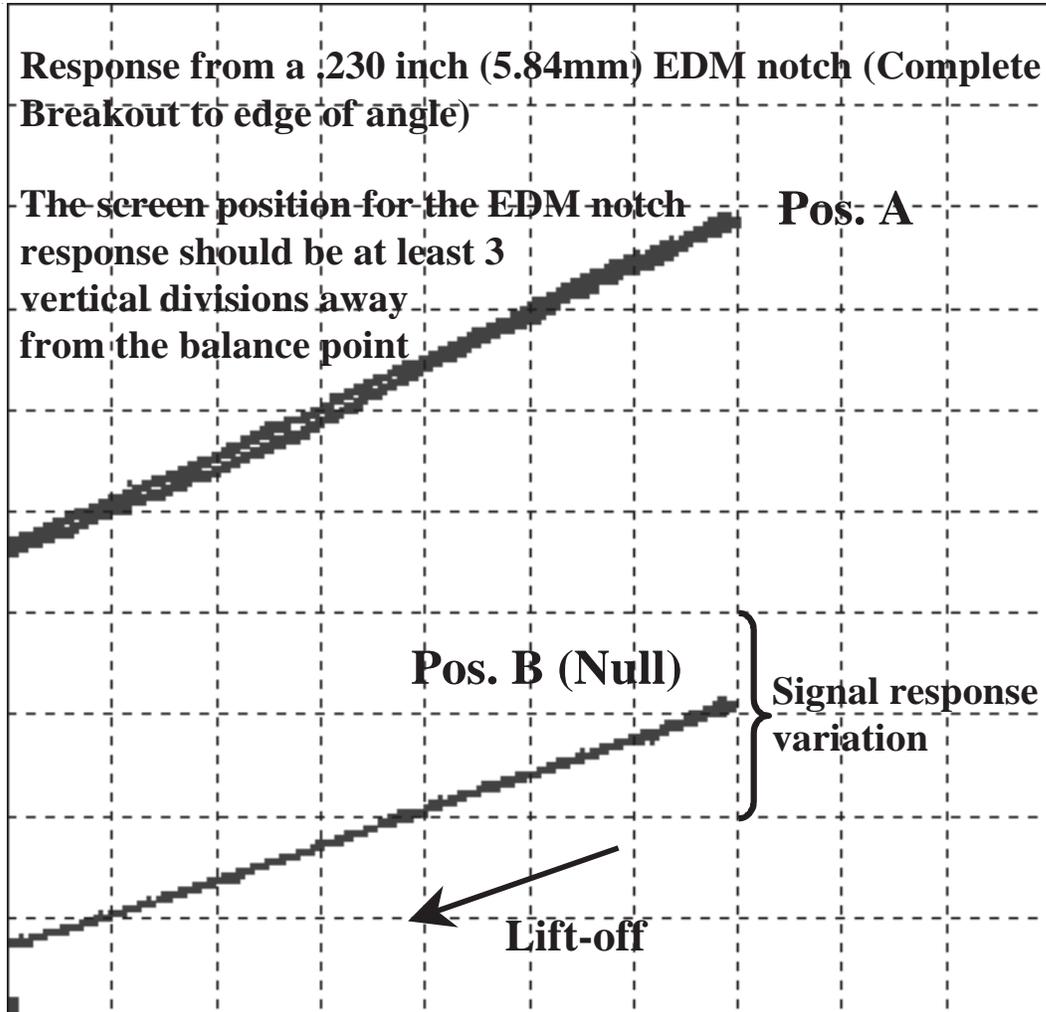
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APPENDIX B**



MOVEMENT OF FLYING DOT TO THE LOWER LEFT HAND CORNER OF THE SCREEN AS PROBE MOVES FROM NULL POINT TO LIFT OFF

FIGURE 10

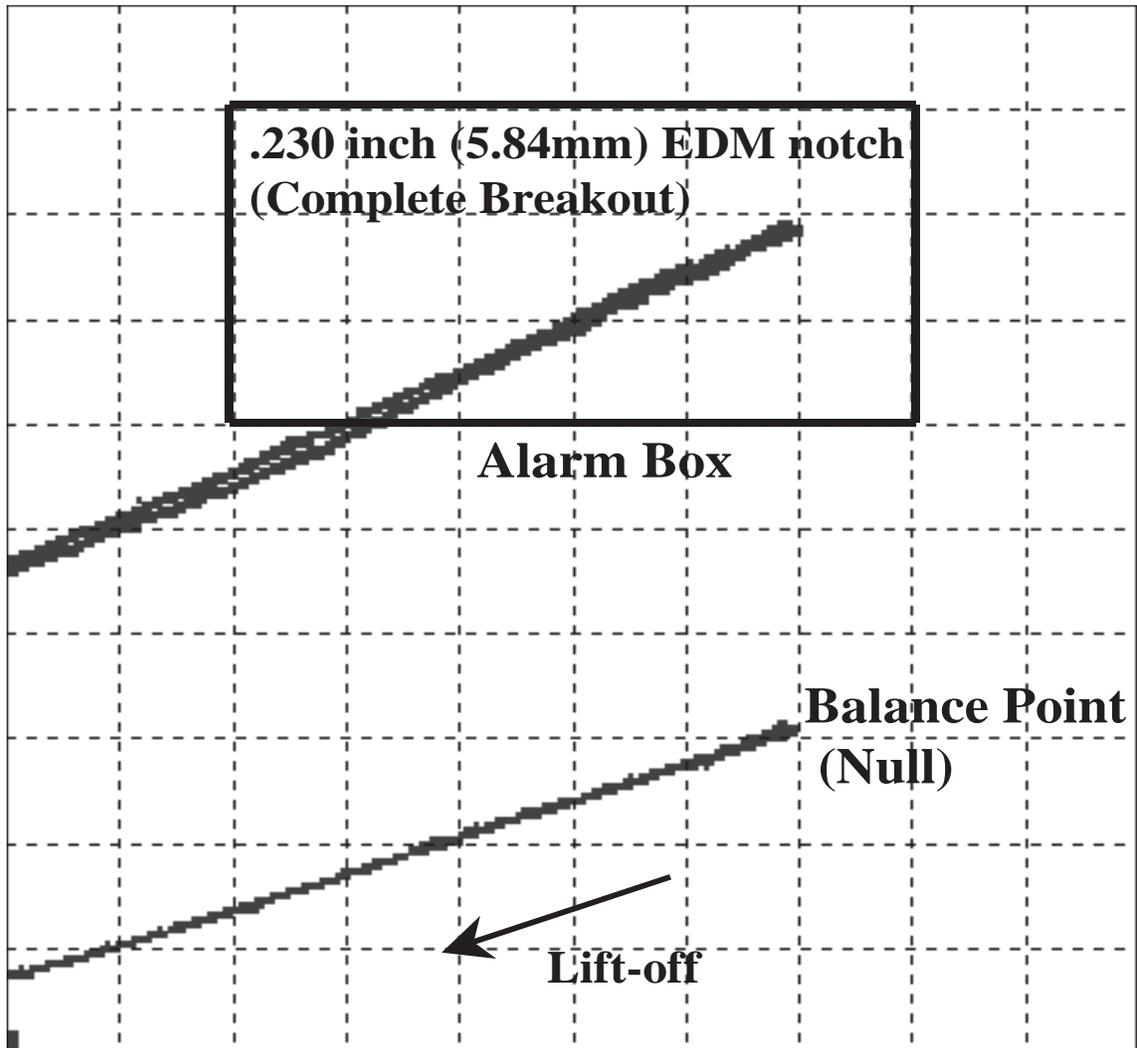
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TYPICAL RESPONSE FROM MS20426 FASTENER (POS. A & POS. B) ON THE CALIBRATION STANDARD (SA227 PATTERN 1, W.S. 104.71 TO W.S. 115.00)

FIGURE 11

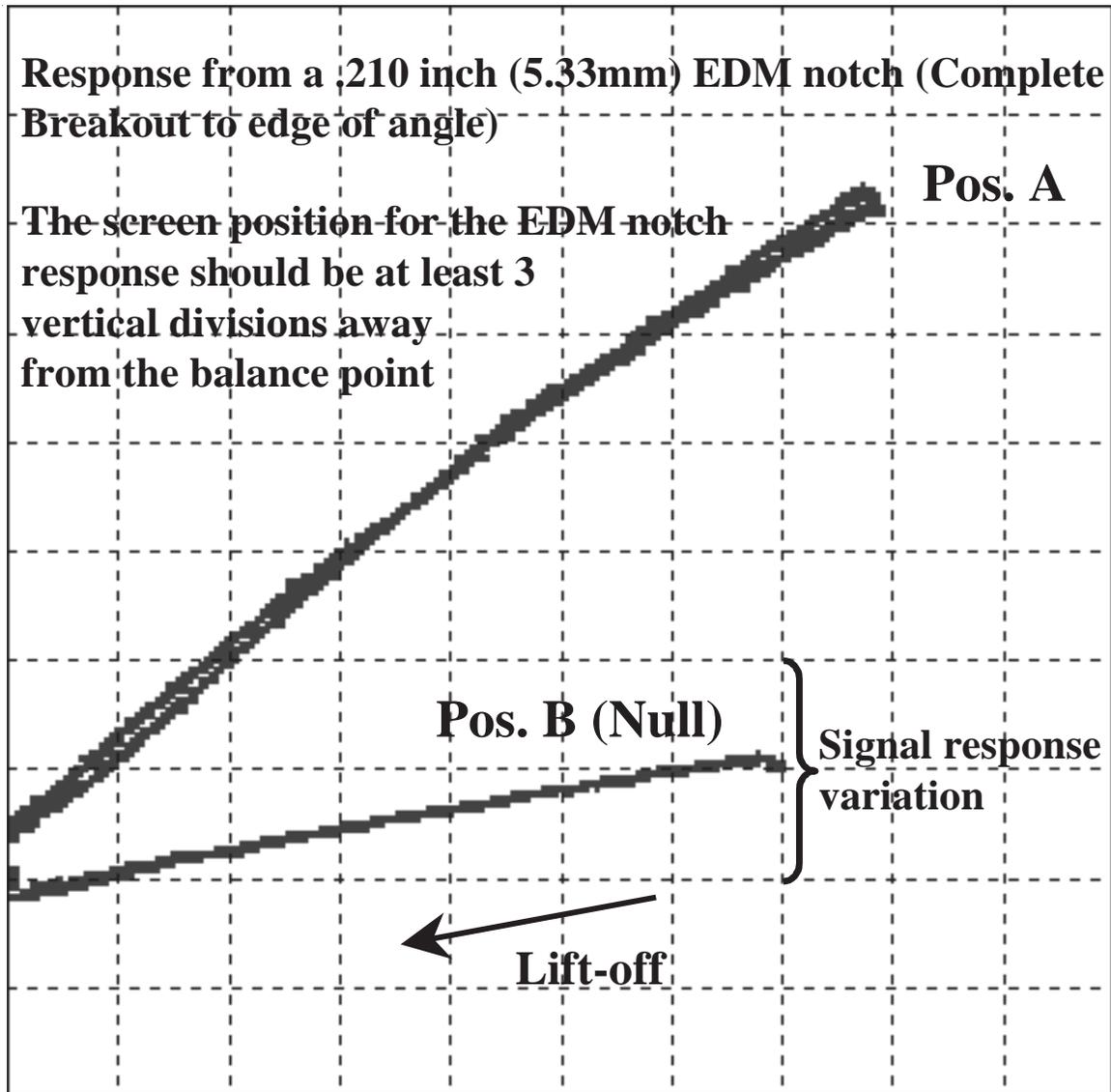
M7 AEROSPACE, LP
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ALARM BOX APPLIED TO 0.230 INCH (5.84 mm) EDM NOTCH
(COMPLETE BREAKOUT) (SA227, PATTERN 1 MS20426 FASTENER)

FIGURE 12

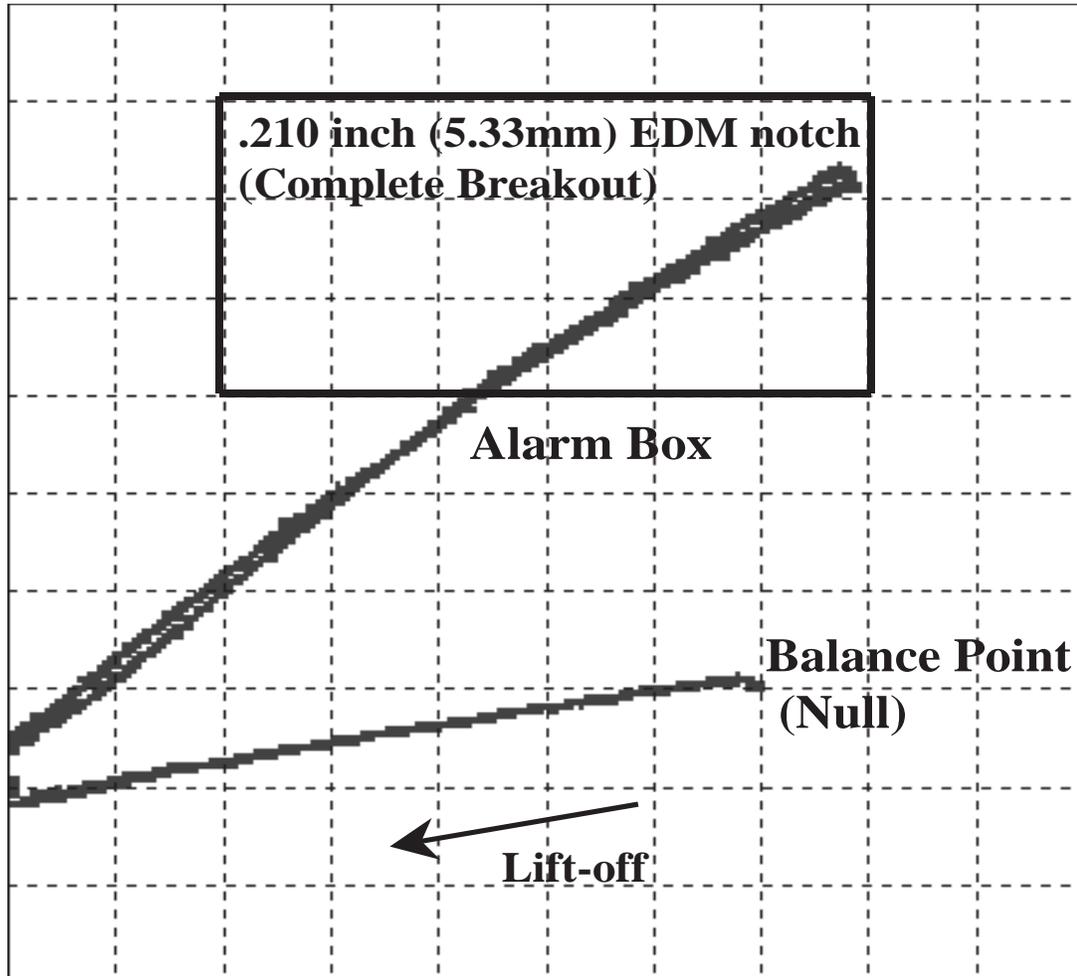
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TYPICAL RESPONSE FROM MS90353 FASTENER (POS. A & POS. B) ON THE CALIBRATION STANDARD (SA227 PATTERNS 2 & 3, W.S. 104.71 TO W.S. 115.00)

FIGURE 13

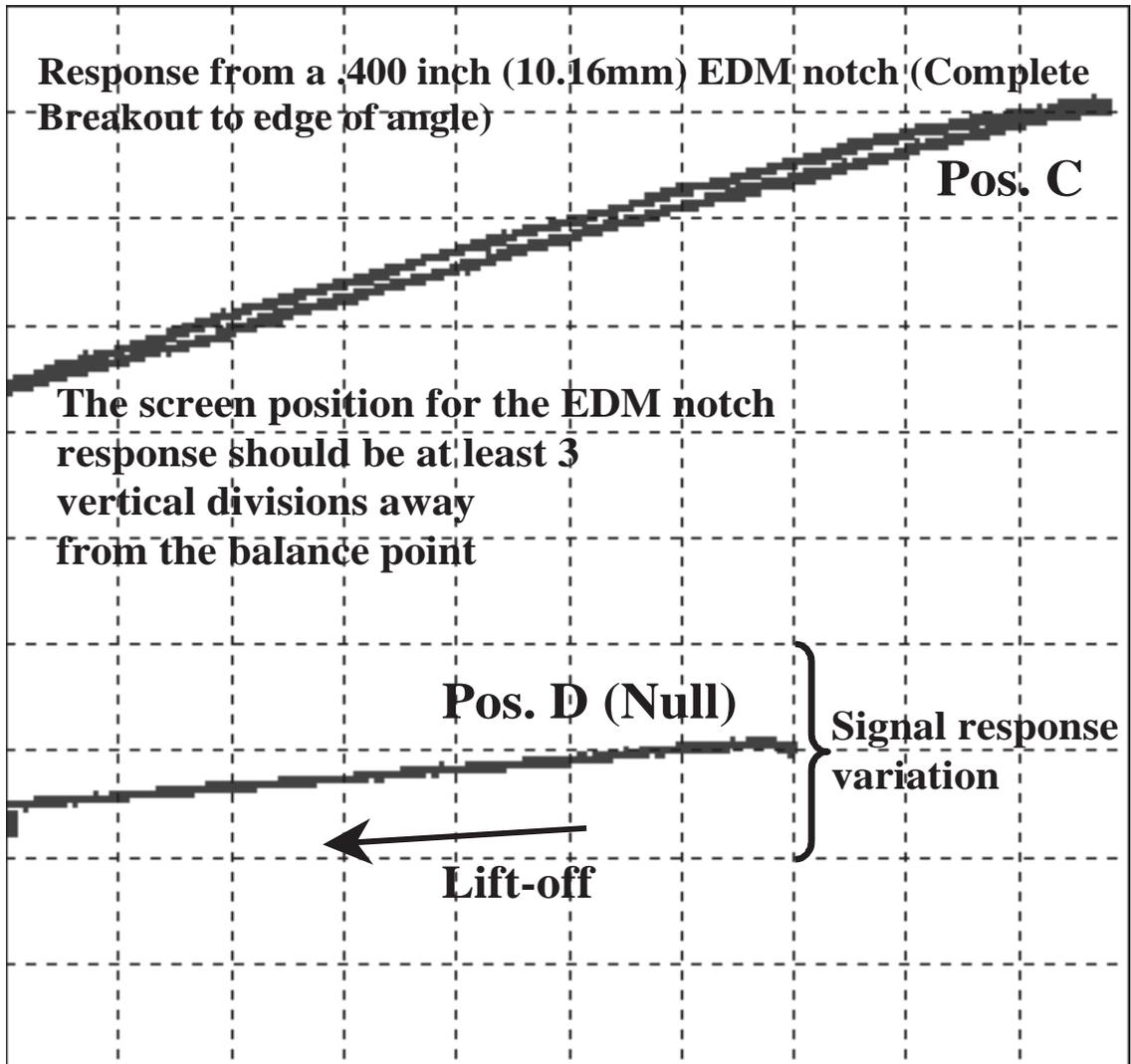
M7 AEROSPACE, LP
SA227 SERIES AIRCRAFT
SUPPLEMENTAL INSPECTION DOCUMENT
APPENDIX B



ALARM BOX APPLIED TO 0.210 INCH (5.33 mm) EDM NOTCH
(COMPLETE BREAKOUT) (SA227, PATTERNS 2 & 3, MS90353 FASTENER,
POS. A & POS. B)

FIGURE 14

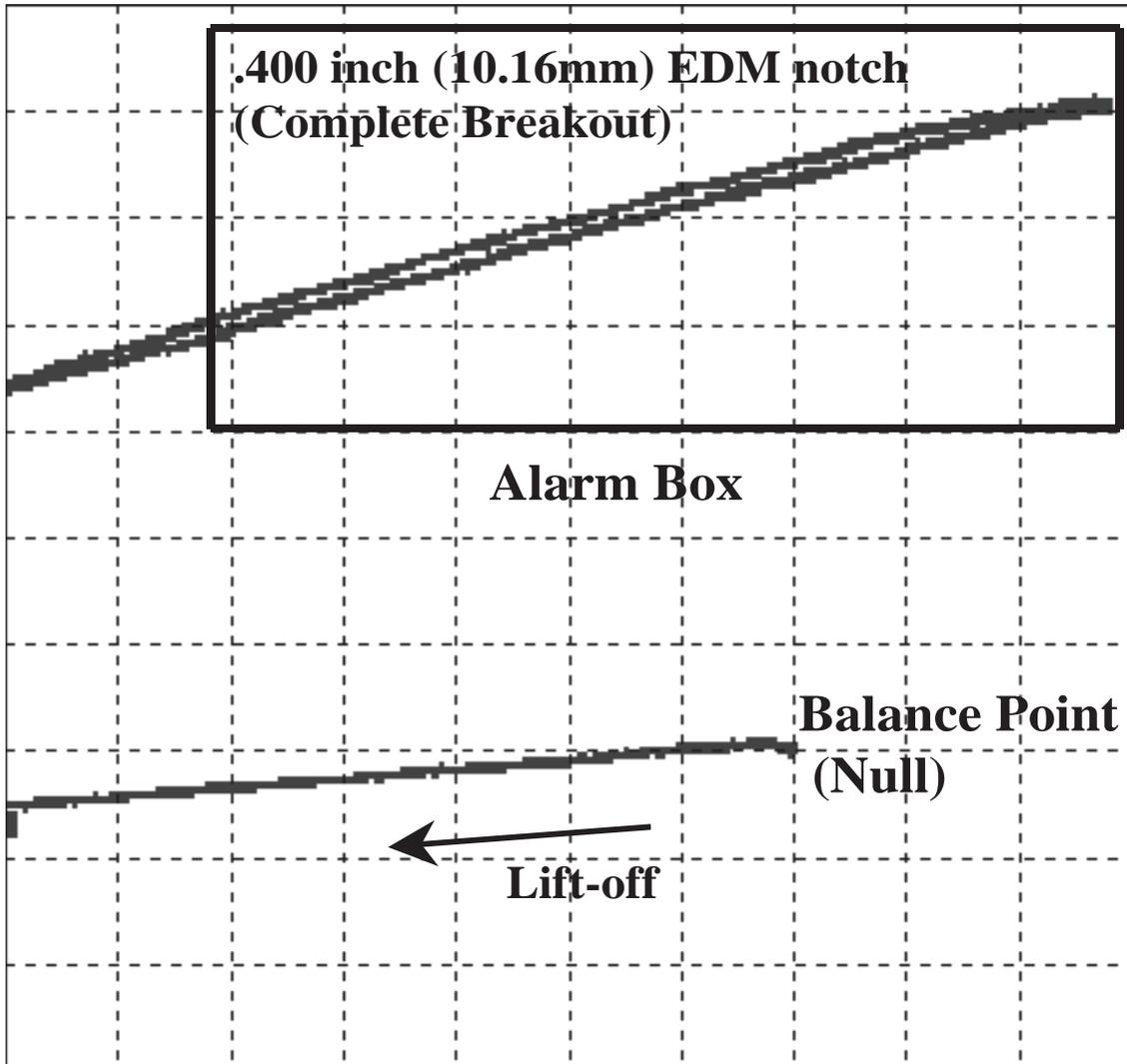
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TYPICAL RESPONSE FROM MS90353 FASTENER (POS. C & POS. D) ON THE CALIBRATION STANDARD (SA227 PATTERNS 2 & 3, W.S. 116.00 TO W.S. 133.00)

FIGURE 15

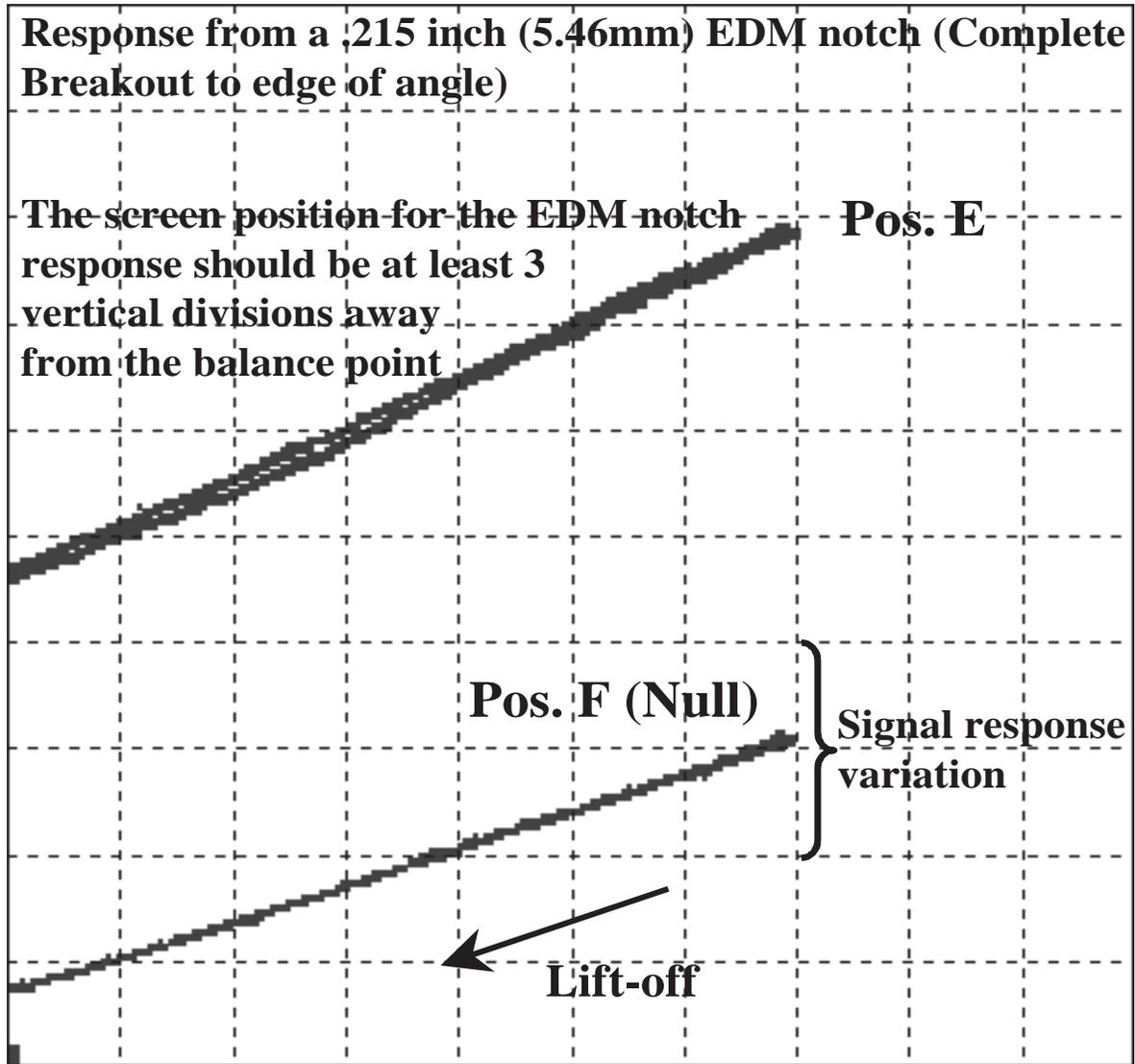
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ALARM BOX APPLIED TO 0.400 INCH (10.16 mm) EDM NOTCH
(SA227, PATTERNS 2 & 3, MS90353 FASTENER, POS. C & POS. D)

FIGURE 16

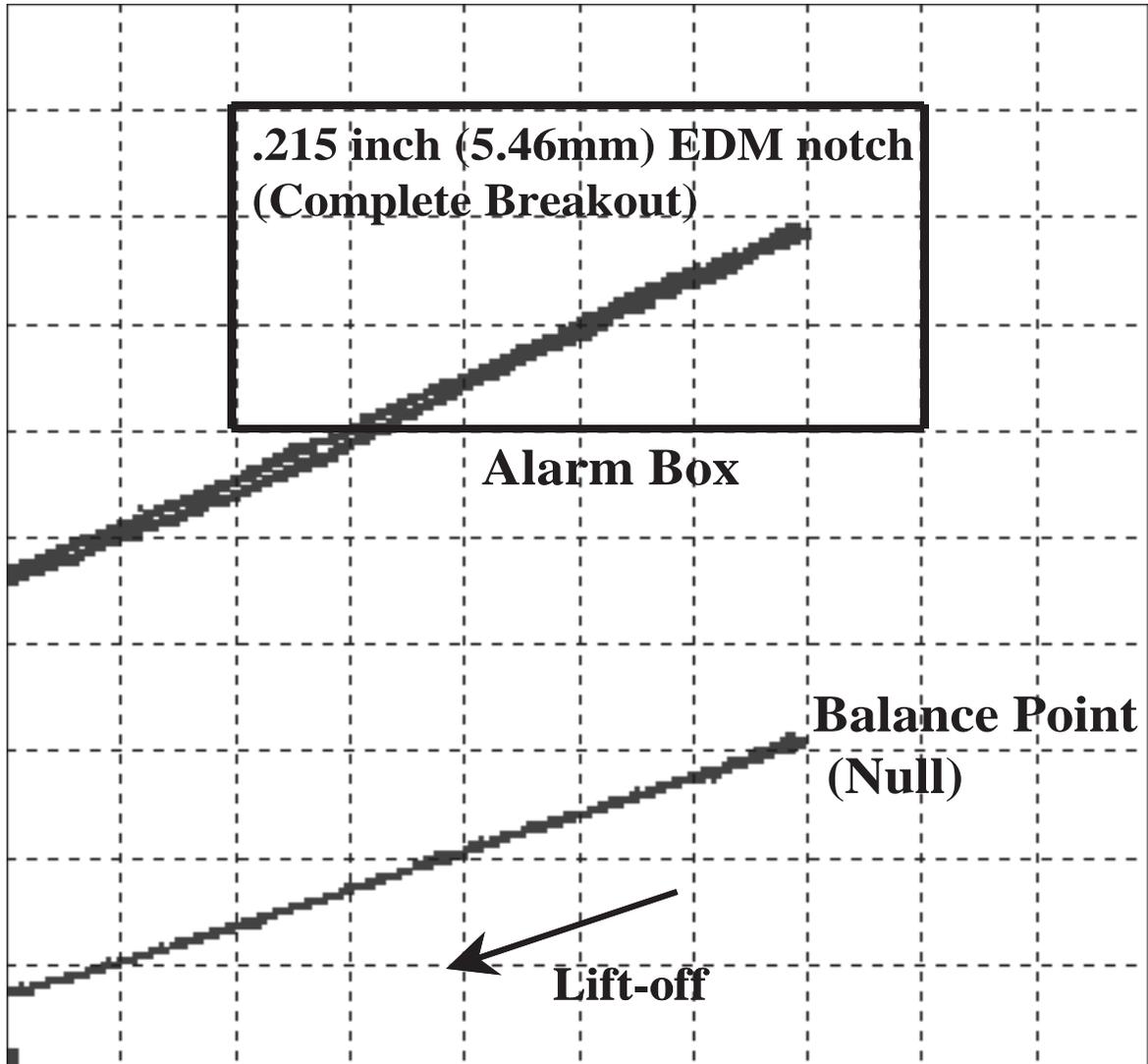
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TYPICAL RESPONSE FROM NAS7026 FASTENER (POS. E & POS. F) ON THE CALIBRATION STANDARD (SA227 PATTERNS 2 & 3, W.S. 104.71 TO W.S. 115.00)

FIGURE 17

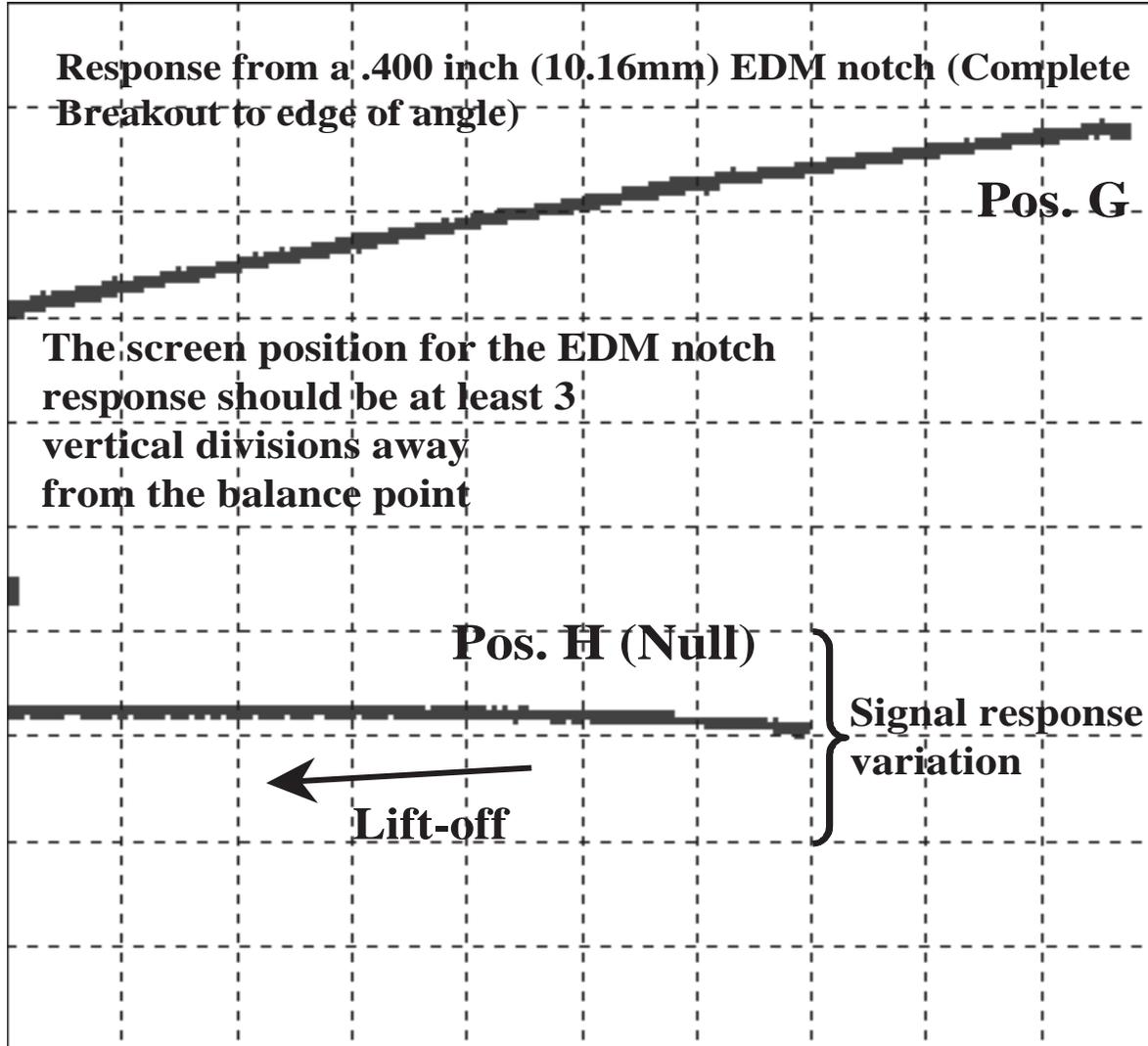
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APPENDIX B



ALARM BOX APPLIED TO 0.215 INCH (5.46 mm) EDM NOTCH
(COMPLETE BREAKOUT) (SA227, PATTERNS 2 & 3, NAS7026 FASTENER,
POS. E & POS. F)

FIGURE 18

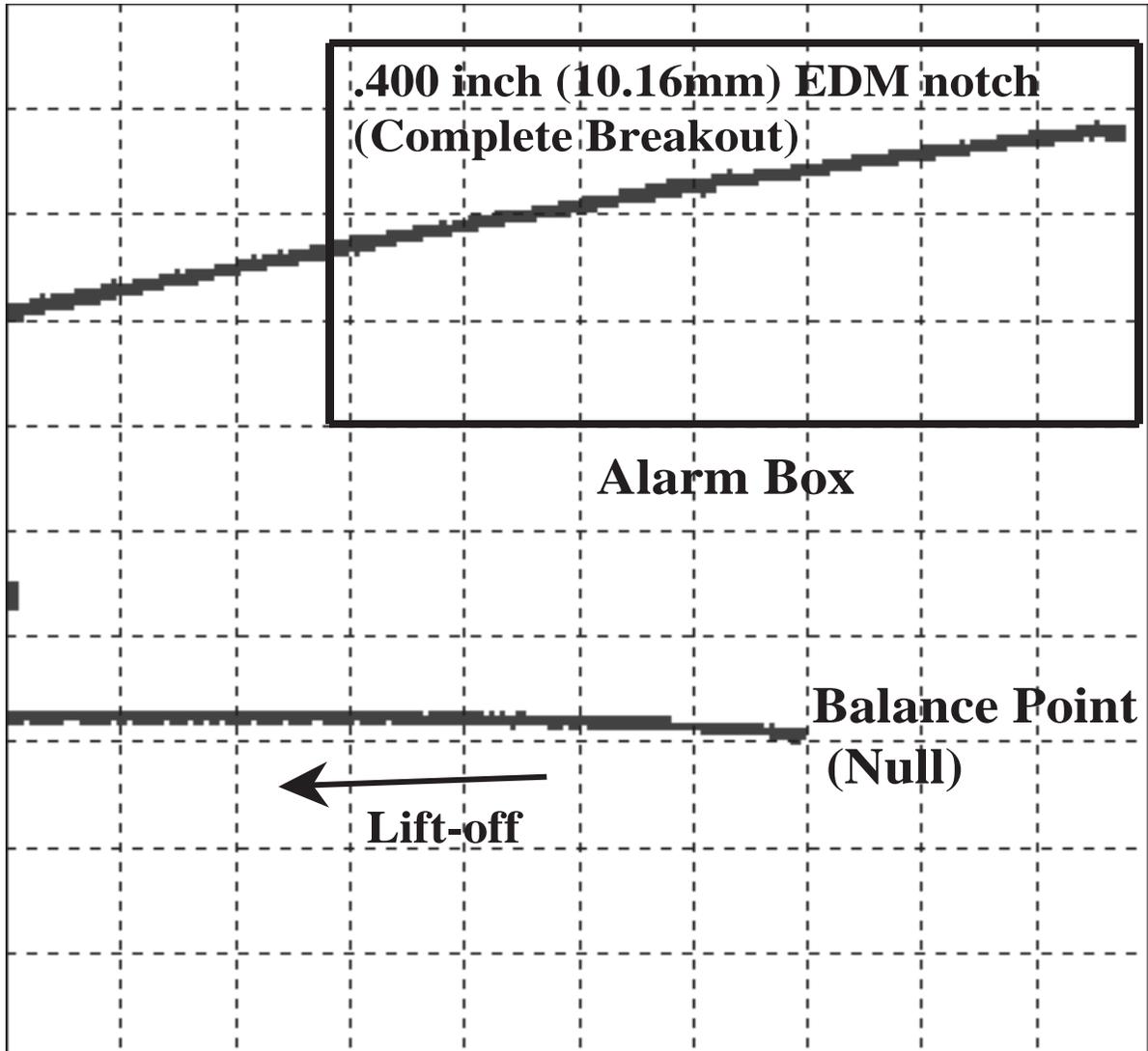
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TYPICAL RESPONSE FROM NAS7026 FASTENER (POS. G & POS. H) ON THE CALIBRATION STANDARD (SA227 PATTERNS 2 & 3, W.S. 116.00 TO W.S. 133.00)

FIGURE 19

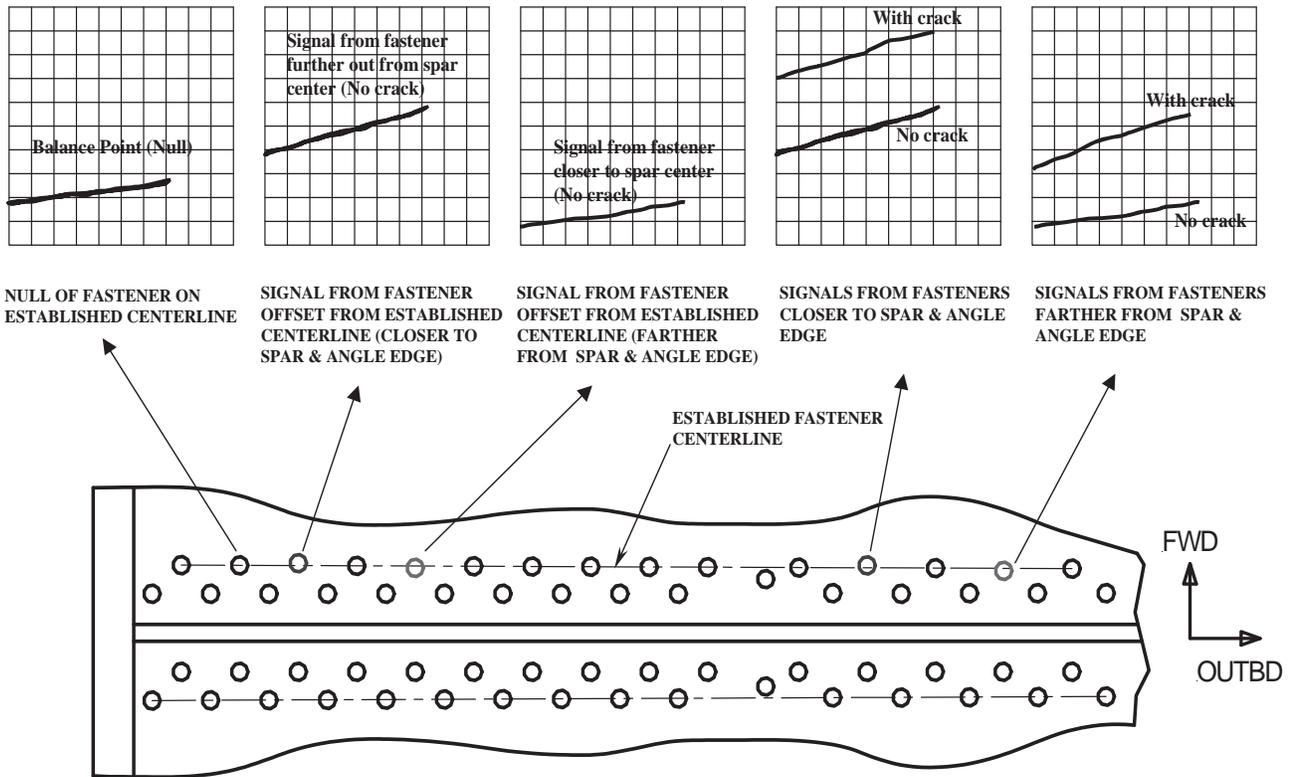
M7 AEROSPACE, LP
SA227 SERIES AIRCRAFT
SUPPLEMENTAL INSPECTION DOCUMENT
APPENDIX B



ALARM BOX APPLIED TO 0.400 INCH (10.16 mm) EDM NOTCH
(SA227, PATTERNS 2 & 3, NAS7026 FASTENER, POS. G & POS. H)

FIGURE 20

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SA227 LOWER WING SPAR FASTENER PATTERN 1 LEFT SIDE

SIGNAL RESPONSES FROM OFFSET FASTENER SITES

FIGURE 21

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SUPPLEMENTAL INSPECTION DOCUMENT
APPENDIX B**

<u>INSPECTION LOG SHEET</u>		AIRCRAFT SERIAL NO.: BC335	FASTENER POSITION ON EC SCREEN :																																						
FLIGHT HOURS: 32,125		V: <u>3</u> H: <u>7</u>																																							
INSPECTION COMPLETED BY: T. JONES		COMMENTS: RIVET 18 HAD A 3 DIVISION INDICATION ABOVE THE NULL, INVESTIGATED WITH INTERNAL SURFACE SCAN OF THE SPAR AND ANGLE EDGE. NO INDICATION OF A CRACK. RIVET IS OFFSET FROM CENTERLINE AND IS CLOSER TO EDGE OF SPAR.																																							
DATE: 6-30-02																																									
NULL ON FASTENER NO. : 2 AND 7																																									
FASTENER SIGNALS																																									
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">+3</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">-1</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">-2</td><td style="border: 1px solid black; padding: 2px;">+1</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">-1</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">+1</td><td style="border: 1px solid black; padding: 2px;">NULL</td> </tr> <tr> <td style="text-align: center;">19</td><td style="text-align: center;">18</td><td style="text-align: center;">17</td><td style="text-align: center;">16</td><td style="text-align: center;">15</td><td style="text-align: center;">14</td><td style="text-align: center;">13</td><td style="text-align: center;">12</td><td style="text-align: center;">11</td><td style="text-align: center;">10</td><td style="text-align: center;">9</td><td style="text-align: center;">8</td><td style="text-align: center;">7</td><td style="text-align: center;">6</td><td style="text-align: center;">5</td><td style="text-align: center;">4</td><td style="text-align: center;">3</td><td style="text-align: center;">2</td><td style="text-align: center;">1</td> </tr> </table>				NULL	+3	NULL	NULL	NULL	-1	NULL	NULL	NULL	-2	+1	NULL	NULL	NULL	-1	NULL	+1	NULL	19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	
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19	18	17	16	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1																							
<table style="width: 100%; border-collapse: collapse;"> <tr> <td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">+2</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">-1</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">+1</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">NULL</td><td style="border: 1px solid black; padding: 2px;">-1</td><td style="border: 1px solid black; padding: 2px;">NULL</td> </tr> <tr> <td style="text-align: center;">38</td><td style="text-align: center;">37</td><td style="text-align: center;">36</td><td style="text-align: center;">35</td><td style="text-align: center;">34</td><td style="text-align: center;">33</td><td style="text-align: center;">32</td><td style="text-align: center;">31</td><td style="text-align: center;">30</td><td style="text-align: center;">29</td><td style="text-align: center;">28</td><td style="text-align: center;">27</td><td style="text-align: center;">26</td><td style="text-align: center;">25</td><td style="text-align: center;">24</td><td style="text-align: center;">23</td><td style="text-align: center;">22</td><td style="text-align: center;">21</td><td style="text-align: center;">20</td> </tr> </table>				NULL	NULL	NULL	NULL	+2	NULL	NULL	NULL	-1	NULL	NULL	NULL	NULL	+1	NULL	NULL	NULL	-1	NULL	38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20
NULL	NULL	NULL	NULL	+2	NULL	NULL	NULL	-1	NULL	NULL	NULL	NULL	+1	NULL	NULL	NULL	-1	NULL																							
38	37	36	35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20																							
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;">← OUTBD</div> <div style="text-align: center;">↑ FWD</div> </div>																																									
SA227 LOWER WING SPAR FASTENER PATTERN 2 & 3 RIGHT SIDE																																									

TYPICAL COMPLETED INSPECTION LOG SHEET

**M7 AEROSPACE, LP
SA227 SERIES AIRCRAFT
SUPPLEMENTAL INSPECTION DOCUMENT
APPENDIX B**

<u>INSPECTION LOG SHEET</u>		AIRCRAFT SERIAL NO.:	FASTENER POSITION ON EC SCREEN :
FLIGHT HOURS:	_____	BC335	V: ____ H: ____
INSPECTION COMPLETED BY:	_____	COMMENTS: _____	
DATE:	_____	_____	
NULL ON FASTENER NO. :	_____	_____	
<div style="display: flex; justify-content: space-between; align-items: center;"> <div style="text-align: center;"> <p>FASTENER SIGNALS</p> </div> <div style="text-align: right;"> <p>FWD ↑</p> </div> </div> <p style="text-align: center; margin-top: 10px;">← OUTBD</p>			
<u>SA227 LOWER WING SPAR FASTENER PATTERN 2 & 3 RIGHT SIDE</u>			

INSPECTION LOG SHEET FOR FASTENER PATTERN'S 2 & 3 RIGHT SIDE

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SA226 / SA227 SERIES AIRCRAFT
SUPPLEMENTAL INSPECTION DOCUMENT
APPENDIX C

FMP-57-011

EDDY-CURRENT INSPECTION PROCEDURES. B.L. 9

Effectivity: SA226 - T(B)303E, T(B)394-417, TC398-419, AT070; SA227 - ALL

Airframe Airworthiness Limitations Manuals ST-UN-M001, M002, and M003 require Eddy-Current inspections of the wing. Following are procedures from SWRI Final Report, Project 15-5741.

NOTE: The first time a new instrument or new probe is used, the Initial Instrument Setup Procedure must be accomplished. Once this has been completed, only Aircraft Wing Spar Inspection need be accomplished for each aircraft inspection.

1. Procedure

A. Materials and Equipment Required

- (1) NORTEC NDT-3 Eddy-Current Tester with 500 kHz frequency module (or equivalent)
- (2) NORTEC BP-16 Shielded Bolt Hole Probe (or equivalent)
- (3) NORTEC BP-16 Non-Shielded Bolt Hole Probe (or equivalent)
- (4) Set of Eddy-Current standards as shown in Figure 1
- (5) Set of spacers as shown in Figure 2

NOTE: In this section, optimum settings of the instrument controls will first be determined on the set of standard specimens. The objective in optimizing the instrument settings is to obtain a maximum meter deflection from a crack and a minimum meter deflection from probe lift-off encountered when the probe is not in good contact with the surface. These conditions are determined by first adjusting the X and R Balance Controls to obtain a minimum lift-off response and by adjusting the Gain Controls to obtain the proper meter deflection from a slot in the standard. Although these settings have already been established, they may vary somewhat for different instruments and probes, therefore when a new instrument or probe is used, new settings must be established.

B. Initial Instrument Setup

- (1) Permanently label the BP-16 Shielded Probe as Probe A, and the BP-16 Non-Shielded Probe as Probe B
- (2) Set the probe Depth Collar on Probe A so that its large flat surface is precisely 0.160 inch from the center of the probe active element as shown in Figure 3.

NOTE: It is very important that this measurement be precise or erroneous readings could result.

Tighten the Depth Collar set screw and recheck the measurement. Once the probe depth is set, a drop of cement may be placed between the probe collar and the probe housing (the opposite end from the collar large flat surface) to prevent further movement. This probe will be used for inspection of the first countersunk aluminum layer only so no further adjustment of the collar is necessary.

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SUPPLEMENTAL INSPECTION DOCUMENT
APPENDIX C

- (3) Insert the probe into the hole in the standard from the side with the thin wing skin layer and check for a light snug fit between the hole and the probe as the probe is rotated. If the probe is loose in the hole, place a thin piece of compliant material (i.e. a small piece of rubber band) between the split layers of the probe housing until a light snug fit is obtained.
- (4) On probe B mark a series of scribe lines on the probe housing as shown in Figure 3 with distances from the center of the probe active element measuring 0.250, 0.375, 0.500, 0.625, 0.750, and 0.875 inch

NOTE: It is very important that these measurements be precise and that the scribe lines be very narrow.

- (5) Set the probe depth collar on the 0.625 inch scribe line and adjust the probe fit in the standard same as step B.(3).
- (6) Connect Probe A to the instrument, press Battery Test Button #1, and note the meter reading. Release Button #1, press Battery Test Button #2 and note the meter reading. A meter reading of 60 or greater indicates the batteries are in good condition. For readings below 60, replace batteries.
- (7) Set the instrument controls to the values shown in Table 1 for the first layer of the structure (countersunk aluminum).
- (8) Insert the probe into the hole in the standard from the side with the thin wing skin layer. Place the probe active element 90° from the Mylar tape layer and then adjust the instrument Level Control to bring the meter to approximately a mid-scale value. (The only function of the Level Control is to position the meter on the scale). Alternately rotate the probe so that it is positioned first 90° away from the tape and then precisely over the tape and note the fluctuation in the meter reading. Repeat this procedure, adjust the X Balance Control each time, until a minimum meter deflection is obtained. If the meter goes off scale, position it back on scale with the Level Control. Record the X Balance Control reading in the blank space in Table 2 for use in later inspections.
- (9) Position the probe active element 45° away from the slot and adjust the Level Control until the meter is positioned to a reading of approximately 90 and note the reading.
- (10) Slowly rotate the probe until it is over the slot and a minimum meter reading is obtained. Subtract this reading from that 45° away to obtain the meter deflection from the slot. Rotate the probe back and forth very slowly between the position where maximum downscale deflection is obtained and a position 45° away and adjust the Fine Gain Control each time so that the meter deflection shown in Table 1 is obtained from the slot. Adjust the Level Control as needed to keep the meter on scale. Record the final Fine Gain Control setting in Table 2.
- (11) Connect Probe B to the instrument and set the flat portion of the probe Depth Collar precisely even with the 0.250 scribe line. Tighten the set screw making sure that the collar position does not change as the screw is tightened. This will position the probe in the center of the second aluminum layer of the structure.
- (12) Set the controls on the instrument to the values shown for the second aluminum layer in Table 1.
- (13) Repeat steps B.(8) through (10) and record the final instrument settings in Table 2 for use in later inspections.

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- (14) Set the probe Depth Collar to the 0.500 scribe line. This will position the probe in the center of the fourth layer which is made of titanium. Setup is not required in the third layer because it is also made of titanium and the same readings should result.
- (15) Set the instrument to the values shown for the titanium layer in Table 1 and repeat steps B.(8) through (10) and record the final instrument settings in Table 2 for both titanium layers for use in later inspections.
- (16) Set the probe Depth Collar to the 0.875 scribe line. This will position the probe in the center of the seventh layer which is made of steel. Setup is not required in the fifth and sixth layers because they are also made of steel and the same readings should result.
- (17) Set the instrument to the values shown for the steel layer in Table 1, repeat steps B.(8) through (10), and record the instrument settings in Table 2 for all three steel layers.

Layer	Material	Probe	Probe Depth	Coarse Gain	Fine Gain	X Balance	R Balance	Meter Deflection From Standard
1	Aluminum	B	0.160	3	210	572	818	50
2	Aluminum	B	0.250	3	220	340	879	80
4	Titanium	B	0.500	3	30	591	726	60
7	Steel	B	0.875	2	350	790	166	80

APPROXIMATE SETTINGS FOR INITIAL INSTRUMENT SETUP

TABLE 1

Layer	Material	Probe	Coarse Gain	Fine Gain	X Ball	R Ball	Meter Deflection From Standard	Meter Deflection Indicating Crack
1	Aluminum	A	3	___	___	818	50	50
2	Aluminum	B	3	___	___	879	80	50
3	Titanium	B	3	___	___	726	60	50
4	Titanium	B	3	___	___	726	60	50
5	Steel	B	2	___	___	166	80	50
6	Steel	B	2	___	___	166	80	50
7	Steel	B	2	___	___	166	80	50

EXACT SETTINGS FOR EDDY-CURRENT INSPECTION

TABLE 2

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(C) Aircraft Wing Spar Inspection

Inspection of First Aluminum Layer with Countersink

- (1) Remove screws from the Forward Wing Spar forward and aft flanges three screws inboard and three outboard of LH and RH B.L. 9. Total 12 screws LH and RH, or 24 per aircraft. Screws may be removed one at a time or all at the same time.
- (2) Visually inspect screws and holes for corrosion. Clean holes per SRM 51-30-01. Discard corroded screws.
- (3) Connect Probe A to the instrument.
- (4) Press Battery Test Button #1, then #2. A meter reading of 60 or greater indicates the batteries are in good condition. For readings below 60, replace batteries.
- (5) Adjust the instrument controls according to Table 2 for the first aluminum layer.
- (6) Place the probe in the standard from the side with the thin wing skin at a position 45° away from the slot. Position the meter to a value of approximately 90 using the Level Control and note the reading.
- (7) Slowly rotate the probe until it is over the slot and a minimum reading is obtained. Subtract this reading from that 45° away to obtain the meter deflection from the slot. Adjust the Fine Gain Control if necessary to obtain a deflection of 50 as shown in Table 2.
- (8) Position the probe 90° away from the tape layer and note the meter reading.
- (9) Rotate the probe until it is directly over the tape. The deflection from the tape (reading at 90° minus reading over tape) should be less than approximately 1/2 of that from the slot. If it is greater than 3/4 that from the slot, repeat steps B.(7) through (10) to optimize the instrument setup and then repeat steps C.(5) through (9).
- (10) Insert the probe in the hole to be inspected with the active element facing the outboard side of the hole.
- (11) Rotate the probe very slowly clockwise around the hole keeping uniform pressure against the probe Depth Collar. If the meter rapidly deflects downscale then rapidly upscale similar to the indication from the slot in the standard, then slowly rotate the probe counterclockwise and clockwise until a minimum reading is obtained. Record the amount of deflection (reading before downscale deflection minus minimum reading). Note that slow variations in meter deflection as the probe is rotated are not due to a crack, but to other variables such as probe lift-off.
- (12) Repeat step C.(11) rotating the probe counterclockwise in the hole. If in either step the deflection is greater than 50 the indication should be considered a suspected crack.

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Inspection of Second Aluminum Layer

NOTE: For inspection of the remaining layers of the wing spar it is necessary to find the center of each layer using the Eddy-Current probe. The probe cannot be positioned accurately by simply setting the probe depth according to the nominal layer thicknesses since the stack up of manufacturing tolerances on layer thicknesses can be too large. Inaccuracy of probe positioning will result in reduced sensitivity to corner (approximately triangular shaped) cracks. The center of the layers are found by locating the interfaces between layers with the probe and adding or removing spacers from the probe Depth Collar to position the probe in the center of each layer. It was not necessary to follow this procedure when setting up the instrument on the standard since the standard slots have the same depth through the layer thickness.

- (13) Connect Probe B to the instrument and use this probe for inspection of remaining layers.
- (14) Set the instrument controls according to Table 2 for the second aluminum layer.
- (15) Place the 0.063 inch spacer on the probe in contact with the probe Depth Collar per Figure 3.
- (16) Adjust the Depth Collar so that the edge of the spacer (away from the collar) is aligned with the 0.250 scribe line.
- (17) Place the probe in the standard from the side with the thin wing skin at a position 45° away from the slot. Position the meter to a value of approximately 90 using the Level Control and note the reading.
- (18) Slowly rotate the probe until it is over the slot and a minimum reading is obtained. Subtract this reading from that 45° away to obtain the meter deflection from the slot. Adjust the Fine Gain Control if necessary to obtain a deflection of 80 as shown in Table 2.
- (19) Position the probe 90° away from the tape layer and note the meter reading.
- (20) Rotate the probe until it is directly over the tape. The deflection from the tape (reading at 90° minus reading over tape) should be less than approximately 1/4 of that from the slot. If it is greater than 1/2 that from the slot, repeat steps B.(12) and (13) to optimize the instrument setup and then repeat steps C.(14) through (20).
- (21) Insert the probe in the hole to be inspected with the active element facing the outboard side of the hole.
- (22) Loosen the Depth Collar set screw, and while holding the collar against the wing skin, very slowly withdraw the probe body until the meter indicates a minimum. Adjust the Level Control as necessary to keep the meter on scale. When the meter indicates a minimum reading the probe is positioned at interface A shown in Figure 4. Tighten the set screw at this point.
- (23) Remove the 0.063 spacer and reinsert the probe into the hole being inspected. The active element is now positioned in the center of the second layer.
- (24) Rotate the probe very slowly clockwise around the hole keeping uniform pressure against the probe Depth Collar. If the meter rapidly deflects downscale then rapidly upscale similar to the indication from the slot in the standard, then slowly rotate the probe counterclockwise and clockwise until a minimum reading is obtained. Record the amount of deflection (reading before downscale deflection minus minimum reading). Note that slow variations in meter deflection as the probe is rotated are not due to a crack, but to other variables such as probe lift-off.

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(25) Repeat step C.(24) rotating the probe counterclockwise in the hole. If in either step the deflection is greater than 50 the indication should be considered a suspected crack.

Inspection of Third and Fourth Titanium Layers

(26) Set the instrument controls according to Table 2 for the third and fourth Titanium layers.

(27) Place the 0.063 inch spacer on the probe in contact with the probe Depth Collar per Figure 3.

(28) Adjust the Depth Collar so that the edge of the spacer (away from the collar) is aligned with the 0.500 scribe line.

(29) Place the probe in the standard from the side with the thin wing skin at a position 45° away from the slot. Position the meter to a value of approximately 90 using the Level Control and note the reading.

(30) Slowly rotate the probe until it is over the slot and a minimum reading is obtained. Subtract this reading from that 45° away to obtain the meter deflection from the slot. Adjust the Fine Gain Control if necessary to obtain a deflection of 50 as shown in Table 2. Record this Fine Gain Control setting for use in step C.(37).

(31) Position the probe 90° away from the tape layer and note the meter reading.

(32) Rotate the probe until it is directly over the tape. The deflection from the tape (reading at 90° minus reading over tape) should be less than approximately 1/3 of that from the slot. If it is greater than 2/3 that from the slot, repeat steps B.(14) and (15) to optimize the instrument setup and then repeat steps C.(26) through (32).

(33) To locate the interface between the two Titanium layers, settings different from those for crack detection must be used. Set the instrument controls to: X=500, R=400, Coarse Gain=3, Fine Gain=100.

(34) Insert the probe in the hole to be inspected with the active element facing the outboard side of the hole.

(35) Adjust the Level Control to bring the meter on scale. Loosen the Depth Collar set screw, and while holding the collar against the wing skin, very slowly withdraw the probe body until the meter indicates a minimum. Adjust the Level Control as necessary to keep the meter on scale. When the meter indicates a minimum reading the probe is positioned at interface C shown in Figure 4. Tighten the set screw at this point.

(36) Remove the 0.063 spacer and reinsert the probe into the hole being inspected. The active element is now positioned in the center of the fourth layer.

(37) Set the instrument controls according to Table 2 for the fourth Titanium layer and set the Fine Gain Control to the value recorded in step C.(30).

(38) Rotate the probe very slowly clockwise around the hole keeping uniform pressure against the probe Depth Collar. If the meter rapidly deflects downscale then rapidly upscale similar to the indication from the slot in the standard, then slowly rotate the probe counterclockwise and clockwise until a minimum reading is obtained. Record the amount of deflection (reading before downscale deflection minus minimum reading). Note that slow variations in meter deflection as the probe is rotated are not due to a crack, but to other variables such as probe lift-off.

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- (39) Repeat step C.(38) rotating the probe counterclockwise in the hole. If in either step the deflection is greater than 50 the indication should be considered a suspected crack.
- (40) Place the 0.125 inch spacer on the probe and reinsert the probe into the hole. This will position the probe in the center of the third Titanium layer.
- (41) Repeat steps C.(38) and (39) to inspect the third layer.

Inspection of Fifth through Seventh Steel Layers

- (42) Set the instrument controls according to Table 2 for the fifth through seventh Steel layers.
- (43) Place the 0.063 inch spacer on the probe in contact with the probe Depth Collar per Figure 3.
- (44) Adjust the Depth Collar so that the edge of the spacer (away from the collar) is aligned with the 0.875 scribe line.
- (45) Place the probe in the standard from the side with the thin wing skin at a position 45° away from the slot. Position the meter to a value of approximately 90 using the Level Control and note the reading.
- (46) Slowly rotate the probe until it is over the slot and a minimum reading is obtained. Subtract this reading from that 45° away to obtain the meter deflection from the slot. Adjust the Fine Gain Control if necessary to obtain a deflection of 80 as shown in Table 2.
- (47) Position the probe 90° away from the tape layer and note the meter reading.
- (48) Rotate the probe until it is directly over the tape. The deflection from the tape (reading at 90° minus reading over tape) should be less than approximately 1/4 of that from the slot. If it is greater than 1/2 that from the slot, repeat steps B.(16) and (17) to optimize the instrument setup and then repeat steps C.(43) through (48).
- (49) Insert the probe in the hole to be inspected with the active element facing the outboard side of the hole.
- (50) Loosen the Depth Collar set screw, and while holding the collar against the wing skin, very slowly withdraw the probe body until the meter indicates a minimum. Adjust the Level Control as necessary to keep the meter on scale. When the meter indicates a minimum reading the probe is positioned at interface F shown in Figure 4. Tighten the set screw at this point.
- (51) Remove the 0.063 spacer and reinsert the probe into the hole being inspected. The active element is now positioned in the center of the seventh layer.
- (52) Rotate the probe very slowly clockwise around the hole keeping uniform pressure against the probe Depth Collar. If the meter rapidly deflects downscale then rapidly upscale similar to the indication from the slot in the standard, then slowly rotate the probe counterclockwise and clockwise until a minimum reading is obtained. Record the amount of deflection (reading before downscale deflection minus minimum reading). Note that slow variations in meter deflection as the probe is rotated are not due to a crack, but to other variables such as probe lift-off.
- (53) Repeat step C. (52) rotating the probe counterclockwise in the hole. If in either step the deflection is greater than 50 the indication should be considered a suspected crack.
- (54) Place the 0.125 inch spacer on the probe and reinsert the probe into the hole. This will

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position the probe in the center of the sixth Steel layer.

- (55) Repeat steps C. (52) and (53) to inspect the sixth layer.
- (56) Replace the 0.125 inch spacer on the probe with the 0.250 inch spacer and reinsert the probe into the hole. This will position the probe in the center of the fifth Steel layer.
- (57) Repeat steps C. (52) and (53) to inspect the fifth layer.
- (58) Should crack indications be found in any layer, it is recommended that they be verified through use of other inspection techniques such as a penetrant inspection and borescope.
- (59) Install screws. If screw cad plating is scratched, prime screw or install a new one.
- (60) Report results of all inspections to Fairchild Field Support Engineering whether cracks are indicated or not.

2. Reference:

SECP A-195, B-206, C-199, 27-31251 EO F-3A, SWRI Final Report, Project 15-5741.

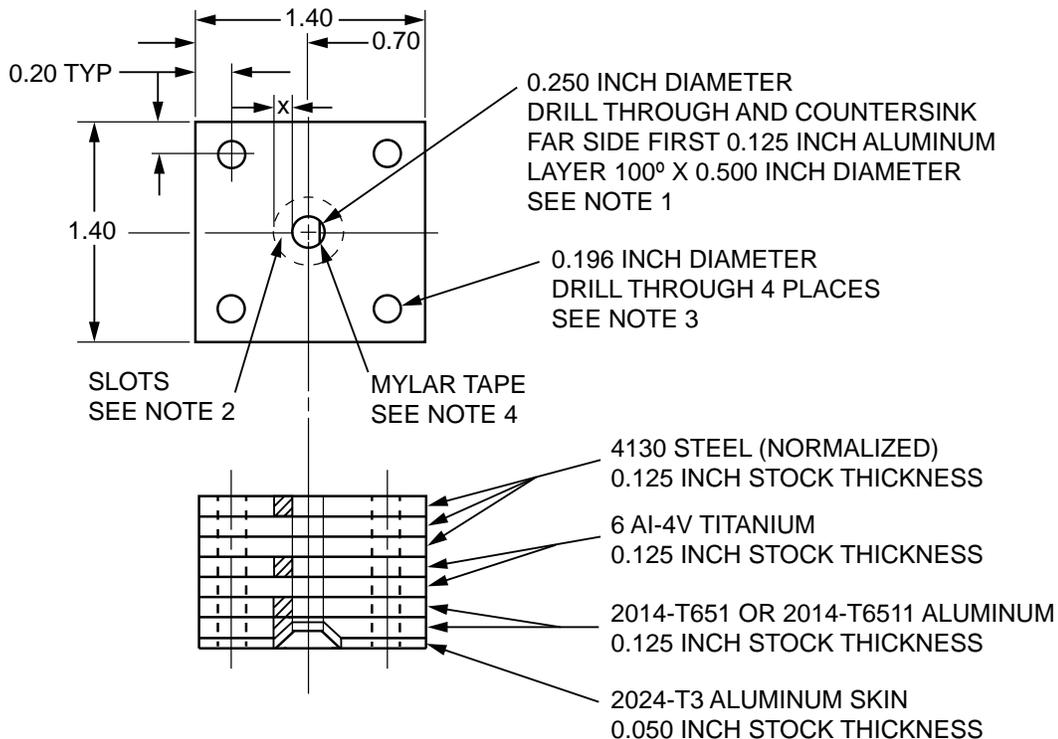
NOTE: Eddy-Current testers other than the Nortec instrument listed above may provide satisfactory results, however Fairchild Aircraft has determined that a 500 kHz frequency is optimum and the Nortec instrument was the best choice. A Halec MK-II instrument was also tried with unsatisfactory results.

3. Material List:

Parts may be locally manufactured or purchased.

<u>PART NUMBER</u>	<u>NOMENCLATURE</u>	<u>QUANTITY</u>
FMP57011-KIT	Kit, Eddy-Current Standard Kit consists of:	1
FMP57011-001	Eddy-Current Standard (Fig.1)	1
FMP57011-002	Spacer, 0.063 (Fig.2)	1
FMP57011-003	Spacer, 0.125 (Fig.2)	1
FMP57011-004	Spacer, 0.250 (Fig.2)	1

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TEMPORARY REVISION 002



NOTE 1: MACHINE ALL PARTS TO SIZE, THEN STACK AND DRILL 0.250 INCH DIAMETER HOLE THROUGH ALL LAYERS IN ONE SETUP USING 0.250 INCH DIAMETER COBALT BIT GROUND TO 68° ANGLE, DRILL SPEED 400-500 RPM, FEED 0.002 INCH/REVOLUTION. COUNTERSINK FIRST ALUMINUM LAYER. DIMPLE SKIN TO FIT COUNTERSINK.

NOTE 2: SLOT DIMENSIONS

LAYER	DEPTH OF X (INCH)
STEEL	0.012 + 0.000 - 0.001
TITANIUM	0.034 + 0.000 - 0.002
ALUMINUM	0.013 + 0.000 - 0.001
ALUMINUM COUNTERSUNK	0.027 + 0.000 - 0.001

CUT SLOTS PREFERABLY USING ELECTRONIC DISCHARGE MACHINING (EDM). OPTIONAL USE 0.006 INCH WIDE JEWELER'S SAW BLADE. SLOT MAXIMUM WIDTH 0.0085 INCH.

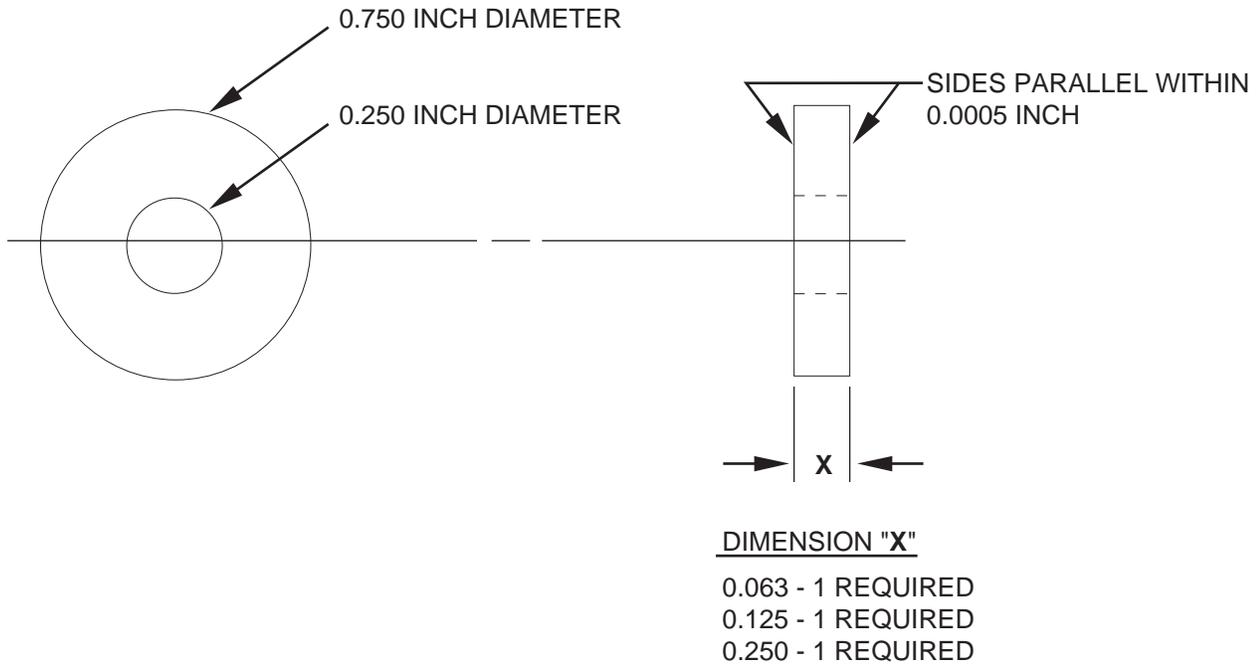
NOTE 3: AFTER CUTTING SLOTS, INSERT 0.2497 = 0.0000 - 0.0002 INCH PRECISION GROUND SHAFT INTO THE 0.250 INCH DIAMETER HOLE FOR ALIGNMENT AND STACK LAYERS AS SHOWN. DRILL FOUR 0.196 INCH DIAMETER HOLES AND INSTALL #10 SCREWS AND NUTS. REMOVE SHAFT.

NOTE 4: PLACE 0.10 INCH WIDE X 0.003 INCH THICK LAYER OF MYLAR TAPE INSIDE HOLE.

SID FIG C-1

Part Number FMP57011-001 Eddy Current Standard
Figure 1

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NOTE 1: MATERIAL: DELRIN, OR EQUIVALENT. THREE SPACERS REQUIRED; ONE EACH THICKNESS SHOWN AS DIMENSION "X".

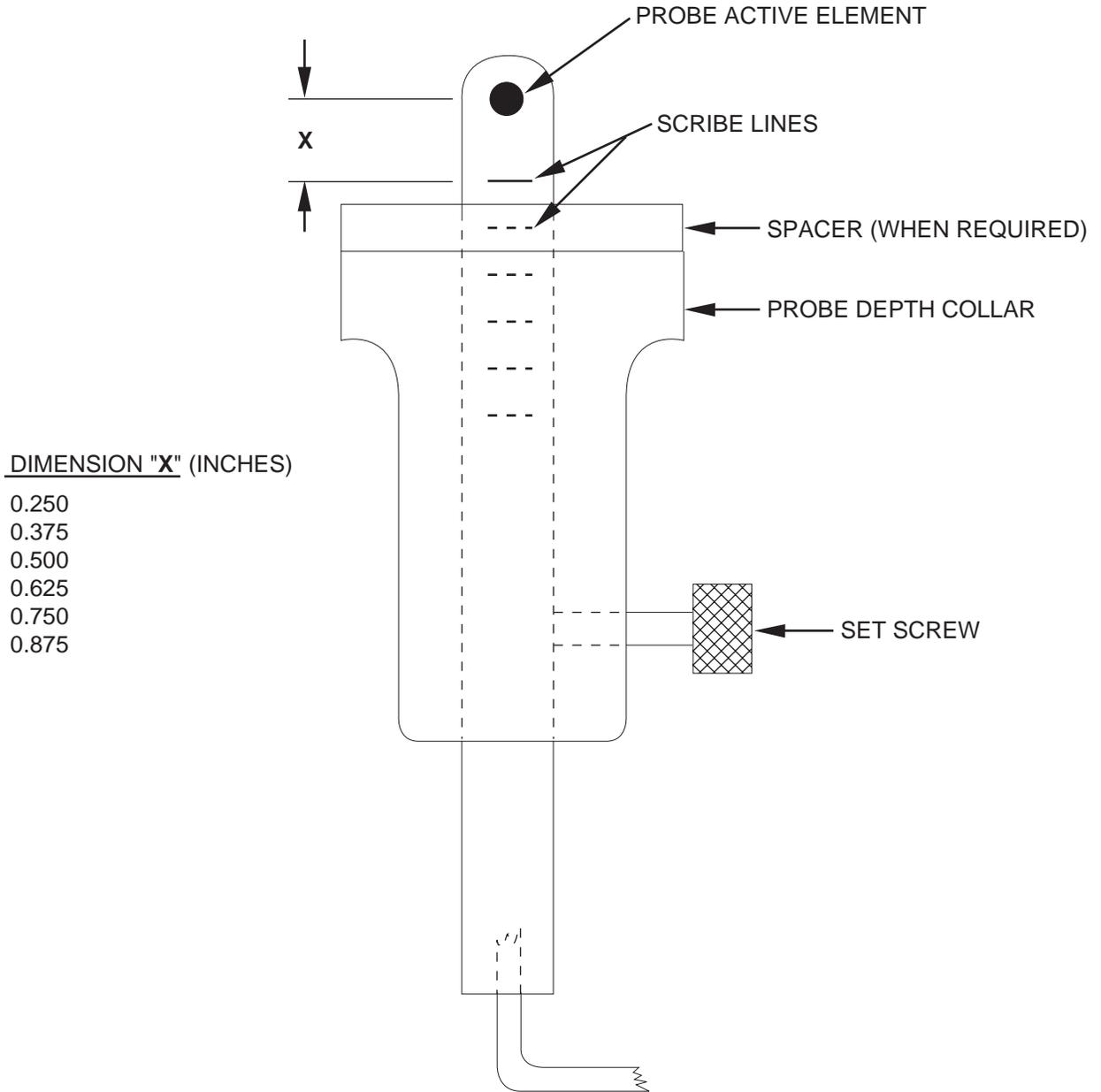
FMP57011-001, -002, -003 PROBE DEPTH SPACERS
FIGURE 2

FMP570112

FMP-57-011

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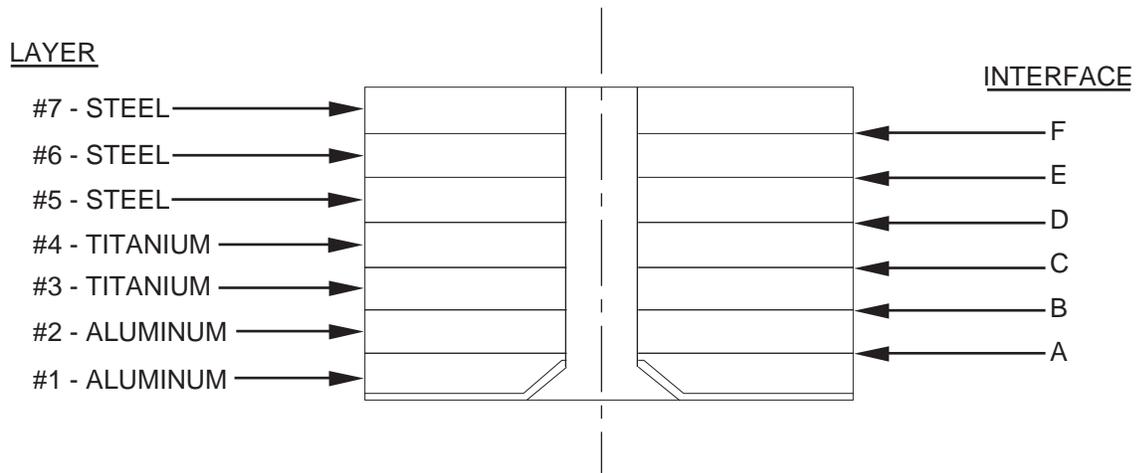


EDDY-CURRENT PROBE
FIGURE 3

FMP570113

FMP-57-011

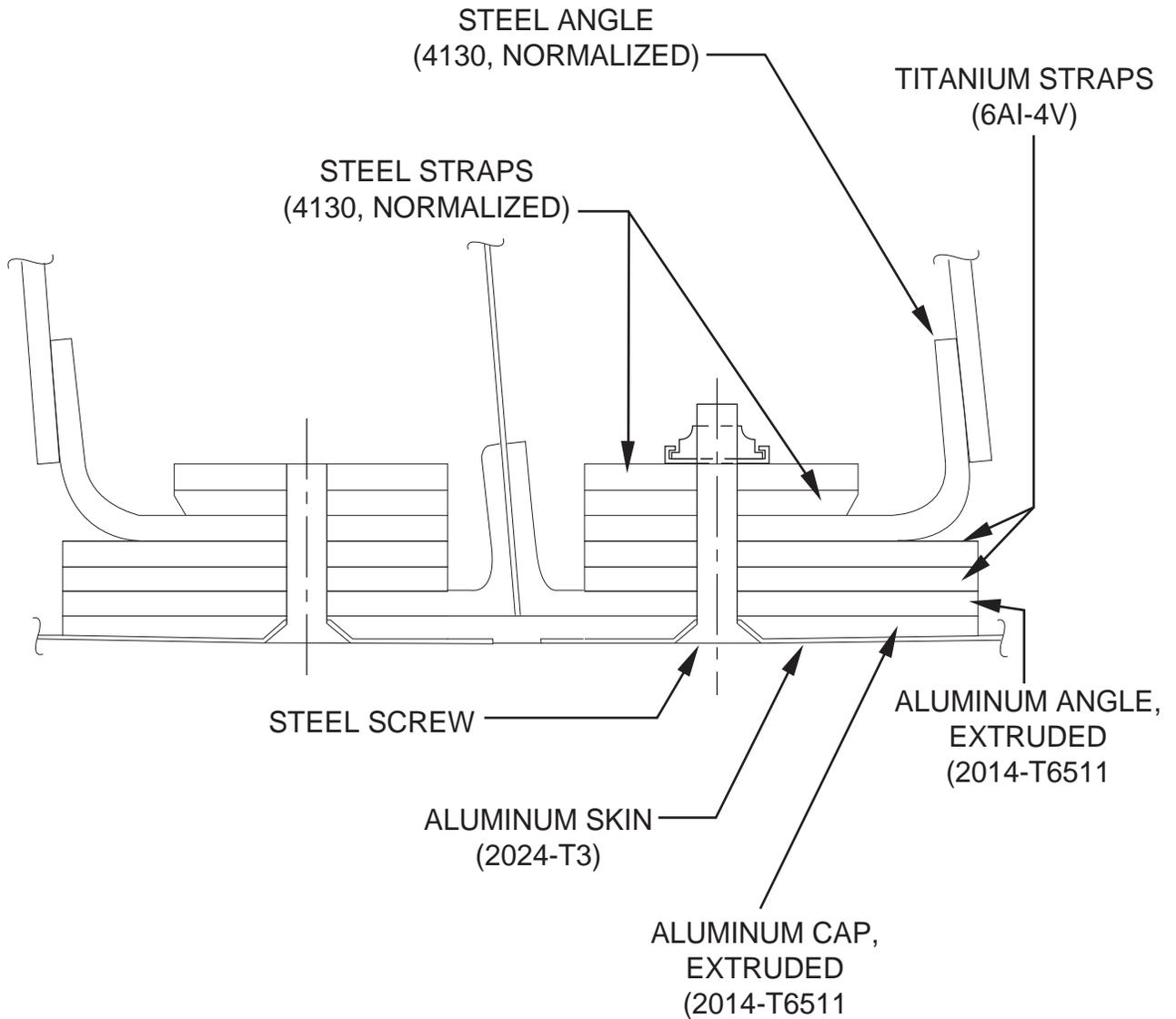
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LAYER AND ITERFACE DESIGNATIONS
FIGURE 4

[FMP570114]

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FMP570115

CROSS SECTION OF WING SPAR AT B.L. 9
FIGURE 5

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