SERVICE BULLETIN

* REVISION NOTICE *

WINGS - CENTER WING UPPER AND LOWER RAINBOW FITTING INSPECTION FOR CRACKS AND REPLACEMENT

Attached is Revision 6, dated July 11, 2013, to Service Bulletin 82-771/382-57-82. Information added or changed in this issue is indicated by a vertical revision bar in the outside margin of affected pages, or pointing hand for illustrations.

The 14 CFR Part 26, Subpart C Aging Aircraft Safety - Widespread Fatigue Damage rule became effective on January 14, 2011. In compliance with this rule, Lockheed Martin Aeronautics Company established a Limit of Validity (LOV) for 382 series aircraft, published in Section VII of customer specific Service Manual Publication (SMP) 515-C Inspection Programs. 14 CFR Part 121 or Part 129 operators must incorporate the LOV into their maintenance program by July 14, 2013 to comply with FAR §121.1115 or §129.115. This revision incorporates maintenance actions required for the center wing rainbow fittings to safeguard the aircraft against widespread fatigue damage up to the LOV, which include updates to the initial and recurring inspection schedule.

This revision is a complete reissue and replaces Revision 5 of this Service Bulletin dated August 12, 2010. Retain this notice with your copy of this Service Bulletin.

List of Previous Revisions and/or Reissues

Basic	December 7, 2004
Revision 1 (Reissue)	February 24, 2005
Revision 2 (Reissue)	February 15, 2007
Revision 3 (Reissue)	April 25, 2008
Revision 4 (Reissue)	May 20, 2009
Revision 5 (Reissue)	August 12, 2010

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File: I-2996R6

SERVICE BULLETIN

WINGS - CENTER WING UPPER AND LOWER RAINBOW FITTING INSPECTION FOR CRACKS AND REPLACEMENT

NOTE: This Service Bulletin contains Appendices A, B, and C.

1. **PLANNING INFORMATION**

A. EFFECTIVITY

(1) **382-57-82, FAA Certificated Aircraft:** This Service Bulletin is applicable to all model 382, 382B, 382E, 382F, and 382G series FAA Certificated Hercules aircraft (excluding 382J series aircraft).

(2) **82-771, Foreign Direct Sales Aircraft:** This Service Bulletin is applicable to all model 282, 382, 382C, and 382T series Hercules aircraft (excluding 382U and 382V series aircraft).

(3) **82-771, MAP/FMS/SAP Aircraft:** This Service Bulletin is applicable to all model C-130 series Hercules aircraft (excluding C-130J Hercules aircraft).

B. REASON

(1) Fatigue cracking of the wing upper and lower rainbow fittings on the durability test and on in-service aircraft indicates a requirement to perform inspections prior to the current published Hercules Airfreighter Series Progressive Inspection Procedures and Hercules Airfreighter Progressive Inspection Procedures intervals. Analysis of in-service cracking has shown that these fittings are susceptible to Multiple Site Damage (MSD) and a more frequent inspection is required to ensure that multiple adjacent node cracking does not occur resulting in an unacceptable reduction in residual strength. This Service Bulletin identifies revised inspection intervals in order to reduce the probability of failure to an acceptably low level until such time as the wing joint fittings are replaced consistent with the recommendations identified herein.

NOTE: The inspection intervals provided are subject to individual operator usage severity. The intervals provided in this Service Bulletin are based on the Lockheed Martin Baseline Military and/or Commercial mission profiles and utilization rates. Operators who have completed a Lockheed Martin usage evaluation analysis may adjust the intervals provided in the Service Bulletin by the severity factors developed for their inspection programs.

(2) The 14 CFR Part 26, Subpart C Aging Aircraft Safety - Widespread Fatigue Damage rule became effective on January 14, 2011. In compliance with this rule, Lockheed Martin Aeronautics Company established a Limit of Validity (LOV) for 382 series aircraft, published in Section VII of customer specific Service Manual Publication (SMP) 515-C Inspection Programs. 14 CFR Part 121 or Part 129 operators must incorporate the LOV into their maintenance program by July 14, 2013 to comply with FAR §121.1115 or §129.115. Revision 6 incorporates maintenance actions required for the center wing rainbow fittings to safeguard the aircraft against widespread fatigue damage up to the LOV, which include updates to the initial and recurring inspection intervals.

(3) Lockheed Martin Aeronautics Company recommends that the inspection specified herein be accomplished on all **military** aircraft center wings that have accumulated more than 10,000 Equivalent Baseline Hours (EBH) as determined from Service Bulletin 82-788 Paragraph 2.A. or from Lockheed Martin Aeronautics Company Operational Usage Evaluation in accordance with Service Bulletin 82-788, paragraph 2.B.(2). The initial inspection should be performed at the next convenient maintenance period but not to exceed 365 days or 600 flight hours, whichever occurs first, after receipt of this Service Bulletin. For center wings that have accumulated 15,000 or more total EBH, Lockheed Martin Aeronautics Company recommends restricting the aircraft in accordance with Service Bulletin 82-788 Paragraph 2.B.(4) until the inspection is accomplished. For center wings that have accumulated 20,000 or more total EBH, Lockheed Martin Aeronautics Company recommends grounding the aircraft until the inspection is accomplished. Accomplishment of this inspection in accordance with the basic or Revision 1 of this Service Bulletin meets the intent of the initial inspection. Recurring inspection is recommended at 2,500 EBH for center wings with less than 25,000 total EBH and at 1,000 EBH for center wing that have accumulated 25,000 or more total EBH.

(4) For **commercial** operators, Lockheed Martin Aeronautics Company recommends inspections be completed as follows:

(a) The upper surface rainbow fitting inspection specified in Appendix A should be accomplished for commercial center wings that have accumulated 10,000 or more flight hours. The initial inspection should be performed at the next convenient maintenance period but not to exceed 365 days or 600 flight hours, whichever occurs first, after receipt of this Service Bulletin. For center wings that have accumulated 20,000 or more flight hours, Lockheed Martin Aeronautics Company recommends grounding the aircraft until the inspection is accomplished. Accomplishment of this inspection in accordance with the basic or earlier revisions of this Service Bulletin meets the intent of the initial inspection. Recurring inspection is recommended at 2,500 flight hours.

(b) The lower surface rainbow fitting inspection specified in Appendix B should be accomplished for commercial center wings that have accumulated 15,000 or more flight hours. The initial inspection should be performed at the next convenient maintenance period but not to exceed 365 days or 600 flight hours, whichever occurs first, after receipt of this Service Bulletin. For center wings that have accumulated 20,000 or more flight hours, Lockheed Martin Aeronautics Company recommends grounding the aircraft until the inspection is accomplished. Accomplishment of this inspection in accordance with the basic or earlier revisions of this Service Bulletin meets the intent of the initial inspection. Recurring inspection is recommended at 3,600 flight hours.

(5) Lockheed Martin Aeronautics Company recommends that both upper and lower joint fittings be replaced on **military** aircraft at 25,000 EBH and on **commercial** aircraft at 30,000 flight hours. This will reset the EBH or flight hours to zero with respect to the inspection requirements identified in this Service Bulletin.

C. DESCRIPTION

Inspect center wing upper and lower rainbow fitting for cracks in accordance with Appendices A and B of this Service Bulletin. Hercules Airfreighter Progressive Inspection Procedures and Hercules Airfreighter Series Progressive Inspection Procedures work cards SP-176 (upper fitting) and SP-257 (lower fitting) meet the intent of this Service Bulletin.

Remove installed upper and lower rainbow fitting. Prior to installation of a new rainbow fitting, an Automated Bolt Hole Eddy Current Inspection should be competed in accordance with Appendix C. After all necessary repairs have been completed, install new rainbow fitting.

D. APPROVAL

(1) The aircraft owner/operator shall make an appropriate entry in the aircraft log records upon compliance with this Service Bulletin.

(2) After the work has been completed on each affected aircraft, please complete and mail or fax (770-494-5682) a Notice of Service Bulletin Compliance; or notify Lockheed Martin Aeronautics Company of compliance with this Service Bulletin at website address: www.lockheedmartin.com/eoc and log into Data Library.

E. MANPOWER

NOTE: This Service Bulletin is based upon the configuration of the aircraft as it was delivered from Lockheed Martin Aeronautics Company. Previous Service Bulletins issued by Lockheed Martin Aeronautics Company have been considered in the preparation of this Service Bulletin, but no consideration has been given to peculiar changes made to the aircraft by the owner/operator since its delivery.

The work prescribed in this Service Bulletin has not been performed at the Lockheed Martin facility exactly as described herein. The manpower estimates provided have not been validated and should not be construed as being acceptable for use in making fixed price quotes for accomplishment of the work. These estimates are provided only as a convenience for aircraft owner/operator planning purposes. It is estimated that manhours required, crew size, and elapsed time while the aircraft is out of service are as follows:

TASK	MANHOURS	CREW SIZE	ELAPSED TIME
Inspection Appendix A & B	24	2	12
Removal and Installation of fitting	740	6	410
Inspection Appendix C	24	2	12

F. MATERIAL - COST AND AVAILABILITY

Parts/Materials listed in paragraph 3 are to be supplied by the aircraft owner/operator.

Parts listed in paragraph 3 may also be purchased from Lockheed Martin, as noted, if desired. Direct inquiries concerning prices and availability to the following:

MAIL: Lockheed Martin Aeronautics Company
C-130 Commercial Contracts
Department F532
Zone 0195
86 South Cobb Drive
Marietta, GA 30063-0195, USA

TELEPHONE: (770) 494-5165

FAX: (770) 494-7657

G. TOOLING - PRICE AND AVAILABILITY

(1) For Appendix A:

- Eddy current inspection unit, Nortec 19e, or equivalent.
- Probe, shielded, right angle, 1/2-inch drop, VM Products P/N VM202RA-1/2, or equivalent.
- Probe, pencil, surface, 1/8-inch diameter, Mu Metal shielded, stainless steel body, VM Products P/N VM200-3, or equivalent.
- Cable, 6 foot, Microdot connector, VM Products P/N VM99BM, or equivalent.
- Calibration standard, aluminum, Lockheed Martin Aeronautics Company P/N PDL 457A as illustrated in Nondestructive Inspection (NDI) Procedures Manual Supplement Section 20-40-00 or equivalent.

(2) For Appendix B:

- Eddy Current Flaw Detector, Zetec P/N MIZ-20A, or equivalent.
- Probe, surface, right angle, 1/4-inch drop, VM Products P/N VM202RA-1/4, or equivalent.
- Probe, pencil, surface, 1/8-inch diameter, Mu Metal shielded, stainless steel body, VM Products P/N VM200-3, or equivalent.
- Cable, 6-foot Microdot connector, VM Products P/N VM99BM, or equivalent.
- Calibration standard, aluminum, Lockheed Martin Aeronautics Company P/N PDL 457A as illustrated in Nondestructive Inspection (NDI) Procedures Manual Supplement Section 20-40-00 or equivalent.

(3) For Removal and Installation of Rainbow Fitting:

- 3302624-16F Fixture to locate the New Joint Fitting.
- 3302624-L/R-18F Fixture to Mill the nodes of the new Joint Fitting.
- 185R105-002A Router for milling the new Joint Fitting.
- 446E101-015C Cutter for above router.
- 730M200-004A Depth Micrometer.
- Jig Transit (with Optical micrometer)

(4) For Appendix C:

- Eddy current instrument - Zetec MIZ-21A or equivalent
- Mini probe drive - GE Inspection Technologies P/N 33A100 or equivalent
- Cable, MIZ-21 to mini probe drive - Zetec P/N 2100-03-04 or equivalent
- Probe, rotating hole, reflection type, 200 kHz to 2 MHz, 3/16", 1/4", and 5/16" diameter - GE Inspection Technologies P/N 620-546-156 or equivalent
- Calibration standard, aluminum - VM Products, Inc. P/N VM30889-C1A or equivalent (see Figure C1)

H. WEIGHT AND BALANCE

None.

I. REFERENCES

Nondestructive Inspection (NDI) Procedures Manual Supplement

(1) **382-57-82, FAA Certificated Aircraft**:

Hercules Maintenance Manual

Hercules Airfreighter Progressive Inspection Procedures

Service Bulletin 382-57-84/ Wing - Operational Usage Evaluation and Service Life Assessment

(2) **82-771, Foreign Military Aircraft**:

Hercules Maintenance Instructions Manual

Hercules Airfreighter Series Progressive Inspection Procedures

Service Bulletin 82-788 / Wing - Operational Usage Evaluation and Service Life Assessment

(3) The following Lockheed Martin drawings may be needed for reference

DWG NO.	DESCRIPTION	A/C EFFECTIVITY
LM 398801	LWR Surface Instl	4314-5214
LM 398802	LWR Surface Assy	4314-5214 & MEP 12Y,4R,7W
LM 3333915	LWR Surface Instl	5215 & Subsequent
LM 3333917	LWR Surface Assy	5215 & Subsequent
LM 398803	UPR Surface Instl	4314–5305
LM 398804	UPR Surface Assy	4314–5214 & MEP 12Y,4R,7W
LM 3337184	UPR Surface Instl	5306 & Subsequent
LM 3333918	UPR Surface Assy	5215 & Subsequent
LM 398800	Center Wing Assy	4299–5509
LM 3356018	Center Wing Assy	5510 & Subsequent
LM 370500	Wing Joint Basic Dimension	

J. OTHER PUBLICATIONS AFFECTED

Hercules Airfreighter Progressive Inspection Procedures

Hercules Airfreighter Series Progressive Inspection Procedure

2. **ACCOMPLISHMENT INSTRUCTIONS**

A. INITIAL INSPECTION

(1) This Service Bulletin changes the initial inspection in the Hercules Airfreighter Series Progressive Inspection Procedures to 10,000 Equivalent Baseline Hours (EBH) on **military** aircraft for cracks in center wing upper and lower rainbow fitting (see Appendix A and Appendix B).

(2) This Service Bulletin changes the initial inspection in the Hercules Airfreighter Progressive Inspection Procedures for **commercial** aircraft to 10,000 flight hours for cracks in center wing upper rainbow fitting (see Appendix A) and 15,000 flight hours for cracks in center wing lower rainbow fitting (see Appendix B).

B. RECURRING INSPECTION

(1) This Service Bulletin changes the recurring inspection in the Hercules Airfreighter Series Progressive Inspection Procedures to 2,500 EBH on **military** aircraft with less than 25,000 total EBH accumulated on the center wing and 1,000 EBH on **military** aircraft that have accumulated 25,000 or more EBH total on the center wing.

(2) This Service Bulletin changes the recurring inspection in the Hercules Airfreighter Progressive Inspection Procedures on **commercial** aircraft to 2,500 flight hours for the center wing upper rainbow fitting and 3,600 flight hours for the lower center wing rainbow fitting.

C. REPLACEMENT OF WING JOINT FITTINGS

(1) This Service Bulletin recommends replacement of the upper and lower wing joint fittings in accordance with Hercules Maintenance Instructions Manual on **military** aircraft with more than 25,000 total EBH accumulated on the center wing.

(2) This Service Bulletin recommends replacement of the upper and lower wing joint fittings in accordance with Hercules Maintenance Manual on **commercial** aircraft with more than 30,000 total flight hours accumulated on the center wing.

(3) Preparation for Replacement

(a) Perform Alignment and Symmetry on Aircraft in accordance with SMP583 Structural Repair Manual, Chapter 51-100-00. Retain this data for future reference.

(b) Remove Outer Wings using instructions in SMP581 Fig 57-10-03 or TM382C-2-1 Fig 7-4 and place wings on Cradle.

(c) Remove No. 2 and 3 Engines including lower nacelles.

(d) Conduct a survey of the WS 220 center wing joint plane using a suitable optical transit. Record any disparity in planarity between all nodes. Ref drawings 398800 and 3356018. Contact Lockheed Martin Aeronautics Company if the four corner fittings are not co-planar within drawings requirements.

(e) Removal of all components such as plumbing and wiring necessary to facilitate installation of joint fittings will be accomplished in area between WS 178 and WS 220.

(f) Remove as necessary or disconnect one end of the CWS 213 truss mount diagonal brace. Ref. Drawing (339166).

(g) Remove clips, four per side, common to the corner fittings, wing joint fittings, and skin. See Figure 1 depicting the removed upper rainbow fitting and connections.

(4) Upper Fitting Replacement

WARNING: REPLACE UPPER OR LOWER FITTINGS ONE AT A TIME. RIGHT AND LEFT SIDE MAY BE DONE SIMULTANEOUSLY.

(a) Remove upper fitting by removing attaching fasteners and breaking fay surface sealant. Use caution as to not damage wing structure and attach holes. See Figure 2 for illustrative view of uninstalled Rainbow fittings.

WARNING: EXERCISE CAUTION WHEN INSTALLING OR REMOVING THE NEW FITTING TO AND FROM THE WING. AVOID APPLYING UNDUE FORCE DURING THIS PROCESS TO PREVENT CRACKING THE FITTING AND OTHER WING COMPONENTS.

(b) Clean wing attaching structure such as skin panels, stringers, corner fittings, attaching angles, and straps, of sealant and other particles.

(c) Visually inspect the wing faying structure for possible damage or cracks and perform Automated Bolt Hole Eddy Current inspection of all opened fitting attachment fastener holes in skins, stringers, straps, and angles while fitting is removed in accordance with Appendix C of this Service Bulletin.

(d) Place the new fitting in the wing. Some amount of force may be required to properly align fitting. Reference Drawing 398804 or 3333918 Upper Surface Assy.

(e) Install P/N 3302624-16F (Figure 3) locating fixture and attach it to the four corner fittings. A shim of suitable size and thickness must be placed between the fixture and each of the four corner fittings to allow the joint fitting nodes to protrude for final node milling to assure joint planarity. All four shims must be the same thickness. Reference Engineering Drawing 398800 or 3356018 for wing joint node thickness requirements. All nodes of the rainbow fitting shall be tight against fixture before proceeding.

(f) Check all fitting to wing attaching fastener holes for proper edge distance (2 X Hole Diameter nominal & 1 1/2 X Hole Diameter minimum).

(g) Visually check the new joint fitting for proper placement/alignment prior to drilling operations.

(h) Transfer all fastener holes from center wing mating structure to new joint fitting.

(i) Remove the locating fixture and joint fitting from wing. Clean fitting and the surrounding wing area for debris and burrs.

(j) Reposition the new joint fitting in the wing, picking up previously drilled holes. Fay surface seal in accordance with SMP583 SRM.

(k) Wet install oversize fasteners of appropriate type per engineering drawing and SMP583 SRM.

(l) Install clips common to the corner fitting, wing joint fitting, and skin as shown on engineering drawing.

(5) Lower Fitting Replacement

(a) Remove lower fitting by removing attaching fasteners and breaking fay surface sealant. Remove straps and angles common to the fitting, skin, and stringers. Use caution as to not damage wing structure and attach holes.

(b) Clean wing attaching structure such as skin panels, stringers, and corner fittings of sealant and other particles.

WARNING: EXERCISE CAUTION WHEN INSTALLING OR REMOVING THE NEW FITTING TO AND FROM THE WING. AVOID APPLYING UNDUE FORCE DURING THIS PROCESS TO PREVENT CRACKING THE FITTING AND OTHER WING COMPONENTS.

WARNING: VISUALLY INSPECT THE WING FAYING STRUCTURE FOR POSSIBLE DAMAGE OR CRACKS AND PERFORM AUTOMATED BOLT HOLE EDDY CURRENT INSPECTION OF ALL OPENED FITTING ATTACHMENT FASTENER HOLES IN SKINS, STRINGERS, STRAPS, AND ANGLES WHILE FITTING IS REMOVED IN ACCORDANCE WITH APPENDIX C OF THIS SERVICE BULLETIN.

(c) Place the new fitting in the wing. Some amount of force may be required to properly align fitting. Reference Drawing 398802 or 3333917 Lower Surface Assy for proper fit and installation.

(d) Install 3302624-16F (Figure 3) locating fixture and attach it to the four corner fittings. A shim of suitable size and thickness must be placed between the fixture and each of the four corner fittings to allow the joint fitting nodes to protrude for final node milling to assure joint planarity. All four shims must be the same thickness. Reference engineering drawing 398800 or 3356018 for wing joint node thickness requirements. All nodes of fitting shall be tight against fixture before proceeding.

(e) Check all fitting to wing attaching fastener holes for proper edge distance. (2 X Hole Diameter nominal & 1 1/2 X Hole Diameter minimum)

(f) Visually check the new joint fitting for proper placement/alignment prior to drilling operations.

(g) Transfer all remaining fastener holes from center wing mating structure to new joint fitting

(h) Remove the locating fixture, joint fitting, straps, and angles from wing. Clean components and the surrounding wing area for debris and burrs.

(i) Reposition the new joint fitting, straps, and angles in the wing, picking up previously drilled holes. Fay surface seal in accordance with SMP583 SRM.

(j) Wet install oversize fasteners of appropriate type per engineering drawing and SMP583 SRM.

(k) Install clips common to the corner fitting, wing joint fitting, and skin.

(l) Continue to Fitting Node Procedures.

(6) Fitting Node Milling Procedure

(a) This step is required for milling and optical procedures: Support the aircraft using nose and main landing gear jacks. Mechanically lock jacks to avoid movement during machining. Do not utilize wing jacks. Shoring is required if jacks cannot be mechanically locked.

(b) Position optical transit as required to adequately read the location of the wing joint fittings. Adjust the jacks until the four corner fitting node faces are in the same vertical plane. This step will not be necessary if a suitable transit is used that is equipped with degrees of freedom that permit setting the transit line of sight in a non-vertical plane with the four corner fitting nodes. Verify that the four corner fitting nodes are coplanar and check the amount of joint fitting node face protrusion. Node thickness requirements are defined by Engineering Drawing 398800 or 3356018.

(c) Ensure that Steps 2.C.(6)(a) and 2.C.(6)(b) are accomplished before milling.

(d) Position Milling Fixture 3302624-18F Left or Right (Figure 4) to wing. Using a proper router with micro depth adjustment (Ref: 185R105-002A), measure the depth to corner fitting nodes. Cross check using the transit. Verify that the milling operation will yield the node thickness requirements as defined by 398800 or 3356018 Engineering Drawing. Use router to mill each node.

(e) When replacing both joint fittings, continue the same procedure until all upper and lower nodes are milled to the same plane as the corner fittings. Always cross check optically with transit.

(f) Remove milling fixture.

(g) Ream wing mate holes to final size in accordance with Engineering Drawing 370500.

(h) Touch up finish the milled nodes with MIL-DTL-81706 per specification MIL-C-5541 in accordance with Engineering Drawing 398800 or 3356018.

(7) Final Installation steps

(a) Re-install lower nacelle, engines, outer wings, and any components removed to facilitate replacement of the wing joint fittings.

(b) Perform an Alignment and Symmetry Check and compare reading to those taken at the start of procedure.

(c) Perform necessary functional checks of disturbed systems and return aircraft to service.

D. RESTORE AIRCRAFT TO SERVICE

NOTE: If assistance pertaining to this Service Bulletin or information regarding your Hercules aircraft is needed, contact your local Lockheed Martin Aeronautics Company representative or the Enterprise Operations Center - Technical Support in Marietta, Georgia, USA, as follows:

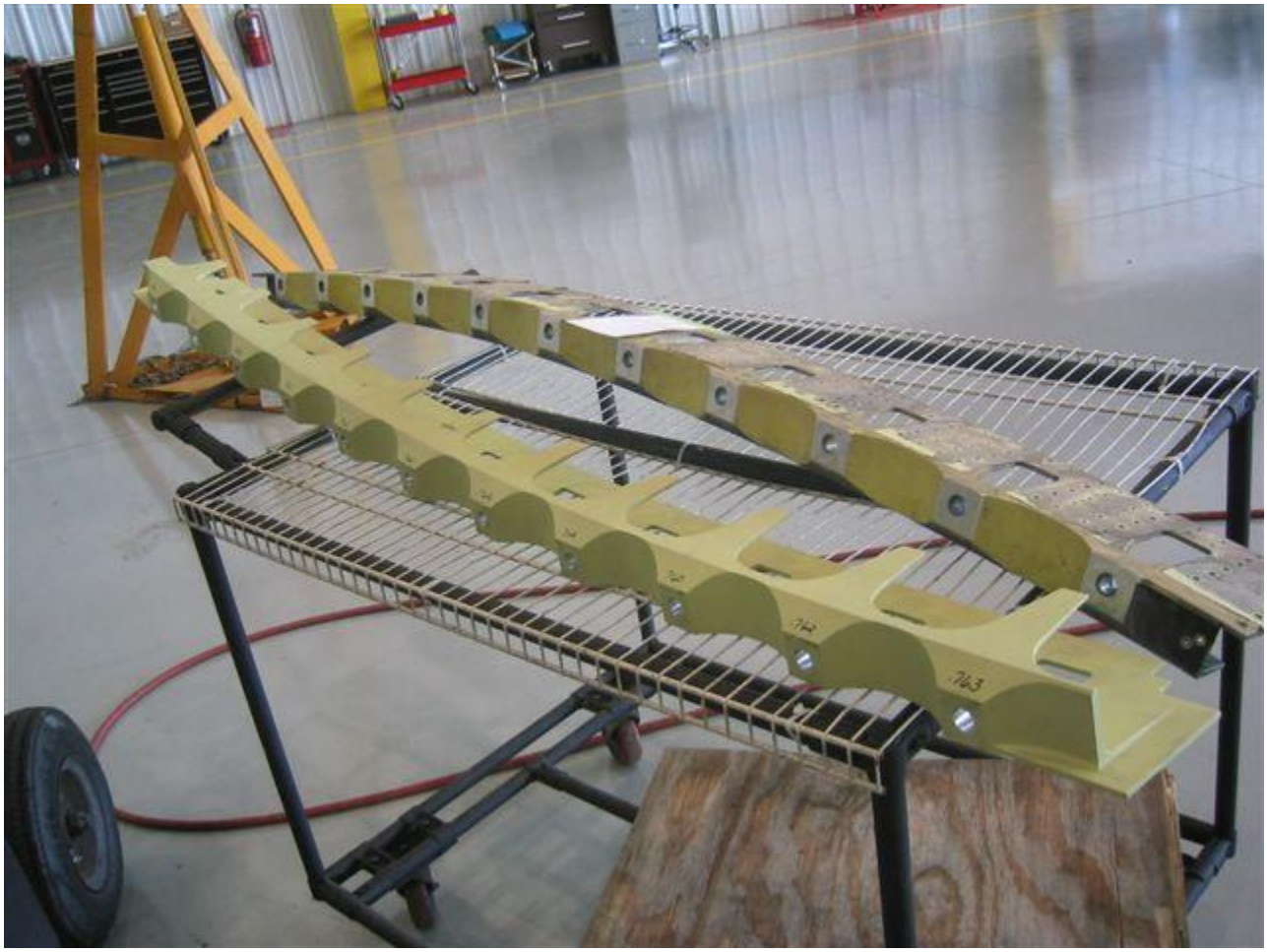
Telephone: (770) 494-9131

Fax: (770) 494-9122

E-Mail: hercules.support@lmco.com

Mail: Lockheed Martin Aeronautics Company
86 South Cobb Drive
Department 3E1M, Zone 0591
Marietta, GA 30063-0591, USA

Center Wing With Removed Upper Rainbow Fittings
Figure 1



Rainbow Fittings
Figure 2

Locating Fixture P/N 3302624-16F Attached To Center Wing
Figure 3

Milling Fixture For Replacement Of Upper And Lower Rainbow Fitting
Figure 4

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3. **MATERIAL INFORMATION**

The following parts/materials, required to modify each aircraft listed in paragraph 1.A., will be provided by the aircraft owner/operator. Parts may be obtained from Lockheed Martin Aeronautics Company in accordance with paragraph 1.F.

NEW PART NUMBER	QUANTITY	KEY WORD	OLD PART NUMBER	INSTRUCTIONS/ DISPOSITION
370517-11/-12	1 each	Upper Surface Wing Joint Fitting		(1)
398335-1/-2	1 each	Upper Surface Wing Joint Fitting		(2)
398335-3/-4	1 each	Upper Surface Wing Joint Fitting		(3)
370518-3/-4	1 each	Lower Surface Wing Joint Fitting		(1)
398827-1/-2	1 each	Lower Surface Wing Joint Fitting		(4)
398827-3/-4	1 each	Lower Surface Wing Joint Fitting		(5)

NOTE:

1. Lockheed Martin Serial Numbers 4299, 4300, 4302, 4303, 4314 through 4322, and 4324.
2. Lockheed Martin Serial Numbers 4323, 4325 through 4937, and Center Wing Replacement MEPs 04R, 07R, 07W, and 12Y.
3. Lockheed Martin Serial Numbers 4301, 4938 and up.
4. Lockheed Martin Serial Numbers 4325 through 4637, and Center Wing Replacement MEPs 04R, 07R, 07W, and 12Y
5. Lockheed Martin Serial Numbers 4301, 4638 and up.

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SERVICE BULLETIN

NOTE: This appendix shows the intent of Work Card SP-176.

NDI CENTER WING UPPER RAINBOW FITTING ACCESS CUTOUTS, CWS 216 TO 219

1. Perform nondestructive inspection of the center wing upper surface wing joint (rainbow) fitting, left, and right, in access cutouts for wing attachment bolts at CWS 216 to CWS 219. (See Figure A1.)

NOTE: Both Primary and Back-up Procedures are to be performed.

2. DESCRIPTION. The upper surface wing joint (rainbow) fitting is fabricated from 7075-T6 aluminum and finished with a sulfuric acid anodize followed with a coating of integral fuel tank polyurethane. The upper surface skin panels are attached to the rainbow fitting in the general inspection area with steel fasteners. The thickness of the rainbow fitting tang tapers from approximately 0.25 to 0.37 inches in the inspection area. The inspection area is located at approximately CWS 216 to CWS 219 on the fore and aft sides of each access cutout for the eleven (11) center wing attach bolts, right, and left wings.

3. DEFECTS. Cyclic loading may cause fatigue cracks to begin in the attach bolt hole counterbore and spot face area or along the edges of the outboard tapered portion of the bolt access cutout in the panel attachment tang and propagate in a chordwise direction.

4. PRIMARY NDI PROCEDURE - EDDY CURRENT.

   NOTE: For support data and locally manufactured items and acceptance/rejection criteria, refer to the Nondestructive Inspection (NDI) Procedures Manual Supplement.

   A. NDI equipment:

      (1) Eddy current inspection unit, Nortec 19e, or equivalent.

      (2) Probe, shielded, right angle, 1/2-inch drop, VM Products P/N VM202RA-1/2, or equivalent.

      (3) Probe, pencil, surface, 1/8-inch diameter, Mu Metal shielded, stainless steel body, VM Products P/N VM200-3, or equivalent.

      (4) Cable, 6 foot, Microdot connector, VM Products P/N VM99BM, or equivalent.

      (5) Calibration Standard, aluminum, Lockheed Martin Aeronautics Company P/N PDL 457A as illustrated in Nondestructive Inspection (NDI) Procedures Manual Supplement Section 20-40-00 or equivalent.

   B. Preparation of airplane: Remove center wing upper surface Wing Joint Access cover on left and right wings in accordance with applicable maintenance instructions.

   C. Access: Access to the upper wing surfaces may be accomplished using the Top Forward Emergency Exit or with appropriate maintenance stands. Use safety restraint harnesses or other available safety equipment when working on top of the wings.

D. Preparation of part: Remove sealant, scaling paints, oil, and grease in the inspection area using the procedures detailed in the Nondestructive Inspection (NDI) Procedures Manual Supplement Section 20-00-00.

E. Instrument settings/calibration: Set up and calibrate the eddy current instrument as specified in Nondestructive Inspection (NDI) Procedures Manual Supplement, Section 20-10-04 for surface scan of Aluminum.

NOTE: The eddy current instrument must be recalibrated when probes are changed.

F. Inspection:

(1) Inspect the upper wing joint fittings at each attach bolt cutout along the complete accessible edge of the cutout from the aft radius area to the forward radius area as illustrated in Figure 1. Use the surface probe to inspect along the accessible upper surface of the fitting tang along the edge of the cutout, starting at the edge of the wing panel overlap, proceeding outboard around the nose of the cutout, then inboard to the opposite wing panel overlap. Use the right angle probe to inspect the interior edge at the fore and aft cutout radius areas. Inspect eleven (11) cutouts on the upper surface rainbow fitting on each left and right wings. Use care when inspecting near steel fasteners in the inspection areas.

(2) A change in the CRT presentation as noted during calibration will indicate a probable crack in the part being inspected.

G. Mark and report suspected defects: Proceed to Backup NDI Procedure.

5. BACKUP NDI PROCEDURE - EDDY CURRENT.

NOTE: For support data and locally manufactured items and acceptance/rejection criteria, refer to the Nondestructive Inspection (NDI) Procedures Manual Supplement.

A. NDI equipment: Same as Primary NDI Procedure.

B. Preparation of airplane: Same as Primary NDI Procedure.

C. Access: Same as Primary NDI Procedure.

D. Preparation of part: Same as Primary NDI Procedure.

NOTE: The eddy current instrument must be recalibrated when probes are changed.

NOTE: A fluorescent penetrant inspection of the suspect area may be performed, but should not be interpreted so as to rule out the possibility of a defect existing if no penetrant indication is visible. Penetrant inspection should therefore be considered for this application only as a possible aid in locating and measuring the defect.

E. Instrument settings/calibration: Set up and calibrate the eddy current instrument as specified in Nondestructive Inspection (NDI) Procedures Manual Supplement, Section 20-10-04 for surface scan of aluminum.

WARNING: PENETRANT INSPECTION MATERIALS CAN INTRODUCE POTENTIAL FIRE AND HEALTH HAZARDS. REFER TO SMP 515-C-NDI PROCEDURES MANUAL SUPPLEMENT SECTION 20-20-00 FOR SAFETY PRECAUTIONS.

F. Inspection: Repeat the Primary NDI Procedure (eddy current scans). Use one of the methods outlined below.

(1) Preferred Method: Different inspector using a different instrument calibrated in accordance with Nondestructive Inspection (NDI) Procedures Manual Supplement Section 20-10-04.

(2) Alternate Method No.1: Different inspector using the same instrument re-calibrated in accordance with Nondestructive Inspection (NDI) Procedures Manual Supplement Section 20-10-04.

(3) Alternate Method No.2: The same inspector, after a one hour delay, using the same instrument re-calibrated in accordance with Nondestructive Inspection (NDI) Procedures Manual Supplement Section 20-10-04.

G. Mark and report indicated defects. If defects are indicated, take appropriate corrective action. If no defects are indicated, proceed to System Securing.

6. SYSTEM SECURING. Restore finishes and sealants, reinstall removed components, remove equipment and supplies from the inspection area, and perform operational checkouts as required in accordance with applicable maintenance instructions.

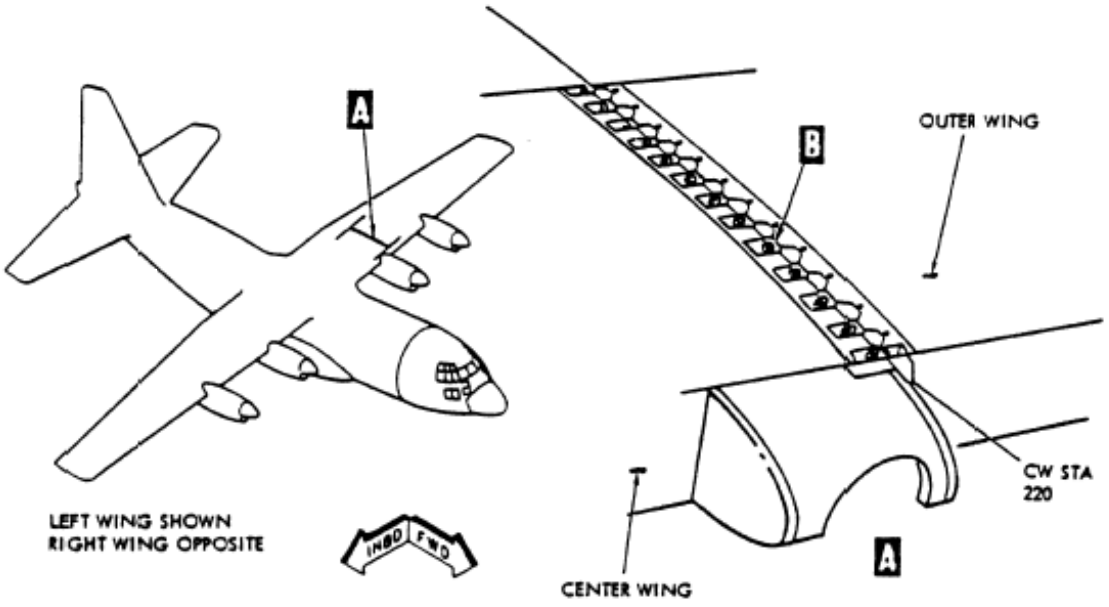

Figure A1. Upper Surface Wing Joint (Rainbow) Fitting, Attachment Bolt Access Cutouts (Sheet 1 of 2)

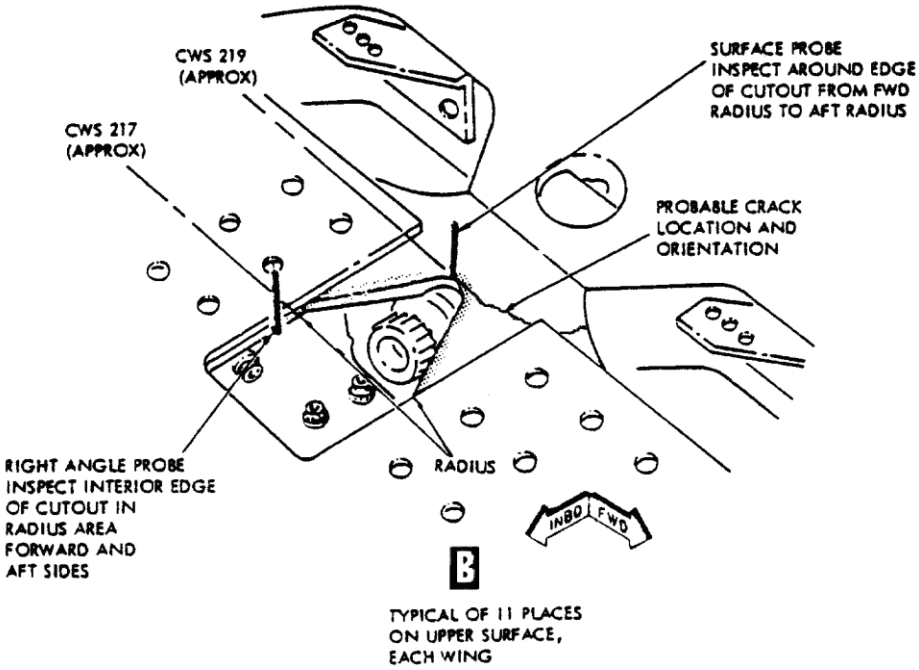

Figure A1. Upper Surface Wing Joint (Rainbow) Fitting, Attachment Bolt Access Cutouts (Sheet 2)

SERVICE BULLETIN

NOTE: This appendix shows a partial intent of Work Card SP-257.

NDI OF CENTER WING LOWER SURFACE RAINBOW FITTING ACCESS CUTOUT, WS 216 TO 219

1. Perform nondestructive inspection of all nodes of the center wing lower surface rainbow fitting, both left and right side. Fatigue cracks may initiate in the rainbow fitting at the lower surface panel and stringer attachment fastener holes or in the attachment bolt counterbore and spot face areas. Cracks will propagate in the fitting in a fore-aft (chordwise) and/or vertical direction. (See Figure B1.) The most common location of cracking is from the outboard part of the bolt access cutout extending across the horizontal face of the node then up the vertical scalloped area between nodes.

   The material within the inspection area is 7075-T6 aluminum.

NOTE: Both Primary and Back-up Procedures are to be performed.

CAUTION: THE SAFETY NOTES AND PRECAUTIONS OF THE HERCULES MAINTENANCE MANUAL AND NONDESTRUCTIVE INSPECTION (NDI) PROCEDURES MANUAL SUPPLEMENT MUST BE COMPLIED WITH THROUGHOUT THE WORK DETAILED IN THIS WORK CARD.

2. PRIMARY NDI PROCEDURE - EDDY CURRENT.

   A. NDI equipment:

      (1) Eddy Current Flaw Detector, Zetec P/N MIZ-20A, or equivalent.

      (2) Probe, surface, right angle, 1/4-inch drop, VM Products P/N VM202RA-1/4, or equivalent.

      (3) Probe, pencil, surface, 1/8-inch diameter, Mu Metal shielded, stainless steel body, VM Products P/N VM200-3, or equivalent.

      (4) Cable, 6-foot, Microdot connector, VM Products P/N VM99BM, or equivalent.

      (5) Calibration standard, aluminum, Lockheed Martin Aeronautics Company P/N PDL 457A as illustrated in Nondestructive Inspection (NDI) Procedures Manual Supplement Section 20-40-00 or equivalent.

      CAUTION: ENSURE POWER IS ISOLATED FROM ALL SYSTEMS IN THE INSPECTION AREA. FAILURE TO ISOLATE POWER MAY CAUSE PERSONNEL INJURY AND AIRPLANE DAMAGE.

   B. Preparation of airplane:

      (1) Isolate power from all systems in the inspection area.

      (2) Remove the lower surface wing joint access strip.

   C. Access: Access to the center wing upper and lower surface is obtained with use of the appropriate maintenance stands.

D. Preparation of part: Remove sealant, scaling paints, oil, and grease in the inspection area using the procedures detailed in the Nondestructive Inspection (NDI) Procedures Manual Supplement Section 20-00-00.

E. Instrument settings/calibration: Set up and calibrate the eddy current instrument as specified in Nondestructive Inspection (NDI) Procedures manual Supplement, Section 20-10-04 for eddy current surface scanning of aluminum.

NOTE: The eddy current instrument must be recalibrated when probes are changed.

F. Inspection:

(1) Scan the entire exposed exterior surface of the rainbow fitting including the exposed radius area in the wing joint between nodes. Scan in both an up and down direction as well as a forward and aft direction. (See Figure B1, View B.)

(2) Scan along the exposed edge of the rainbow fitting tang under the lower surface skin panel. Scan in both an inboard and outboard direction as well as a forward and aft direction. (See Figure B1, View C.)

(3) Lockheed Martin Aeronautics Company recommends two inspectors for this procedure: one to perform the surface scan and the other to monitor the display. Any signal, as noted when scanning notches during calibration, will indicate a probable crack in the part being inspected.

G. Mark and report suspected defects. Proceed to Backup NDI Procedure.

3. BACKUP NDI PROCEDURE - EDDY CURRENT.

A. NDI equipment: Same as the Primary NDI Procedure.

B. Preparation of airplane: Same as the Primary NDI Procedure.

C. Access: Same as the Primary NDI Procedure.

D. Preparation of part: Same as the Primary NDI Procedure.

E. Instrument settings/calibration: Same as the Primary NDI Procedure.

F. Inspection: In order to verify suspect defects repeat the Primary NDI Procedure using one of the methods outlined below.

(1) Preferred Method: Different inspector using different eddy current equipment.

NOTE: The eddy current instrument must be recalibrated before reinspection.

(2) Alternate Method No. 1: Different inspector using the same eddy current equipment.

(3) Alternate Method No. 2: The same inspector using the same eddy current equipment after a one-hour delay.

G. Mark and report confirmed defects: Complete the Primary NDI Procedure and then go to System Securing.

4. SYSTEM SECURING. Restore finishes and sealants; remove equipment and supplies from the inspection area; reinstall removed components; and perform operational checkouts as required.

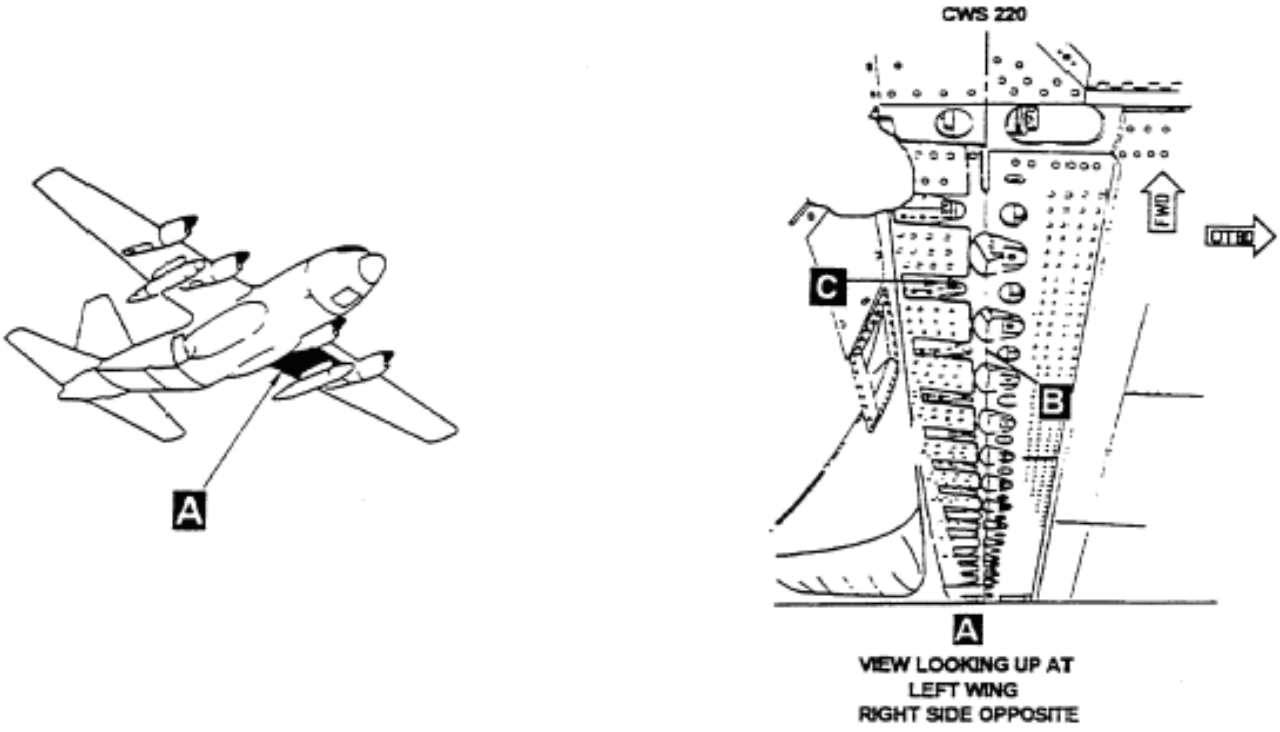

Figure B1. Inspection of Center Wing Lower Surface Rainbow Fitting (Sheet 1 of 2)

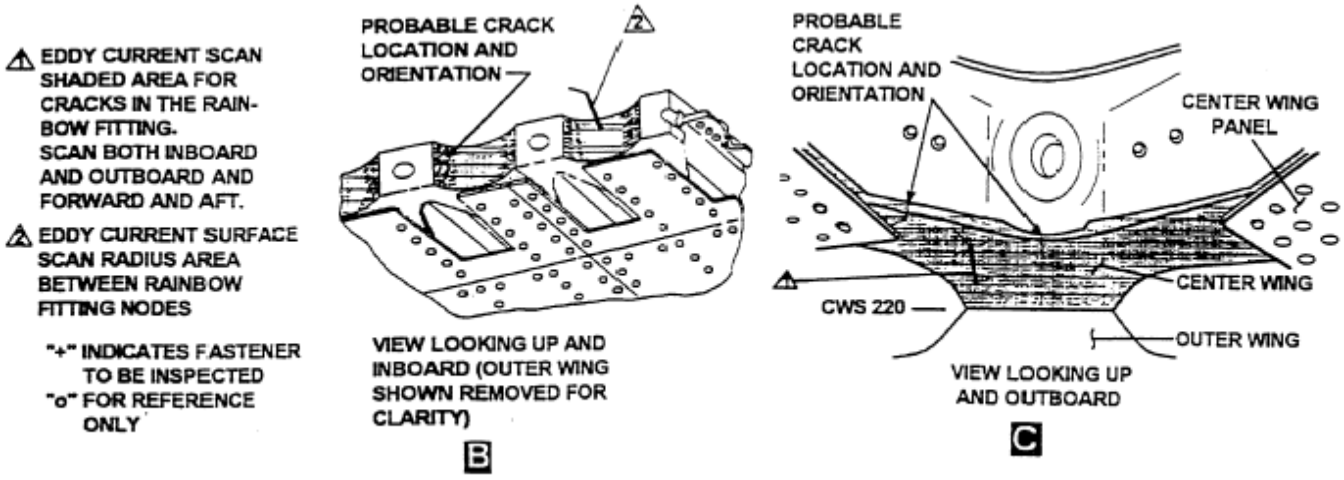

Figure B1. Inspection of Center Wing Lower Surface Rainbow Fitting (Sheet 2)

SERVICE BULLETIN

NDI OF CENTER WING UPPER AND LOWER SURFACE PANELS, STRINGERS, SPLICE STRAPS AND SPLICE ANGLES WITH RAINBOW FITTING REMOVED

1. The purpose of this inspection is to verify the fastener holes in the upper and lower surface skin panel, stringers, splice straps and splice angles that are common to the rainbow fittings are free of defects/damage prior to installing the new. After removal of the rainbow fitting and prior to installing the new rainbow fitting, perform the Primary Inspection procedure.

2. PRIMARY PROCEDURE. AUTOMATED BOLT HOLE EDDY CURRENT

   A. NDI Equipment:

      (1) Eddy current instrument - Zetec MIZ-21A or equivalent

      (2) Mini probe drive - GE Inspection Technologies P/N 33A100 or equivalent

      (3) Cable, MIZ-21 to mini probe drive - Zetec P/N 2100-03-04 or equivalent

      (4) Probe, rotating hole, reflection type, 200 kHz to 2 MHz, 3/16", 1/4", and 5/16" diameter - GE Inspection Technologies P/N 620-546-156 or equivalent

      (5) Calibration standard, aluminum - VM Products, Inc. P/N VM30889-C1A or equivalent (see Figure C1)

   B. Preparation of Part: Remove sealant from the fastener hole(s) with a nylon bristled brush of the appropriate diameter as necessary for acceptable probe contact with the part.

   C. Access: Use appropriate maintenance stands to gain access to the inspection area.

   D. Equipment Calibration:

      (1) Turn the instrument on.

      (2) Connect the cable to the instrument.

      (3) Connect the mini probe drive to the cable.

      (4) Insert the appropriate diameter probe into the mini probe drive.

(5) Use the following initial instrument settings:

FREQ	**500K**
PRB REFL	**HI**
PRB GAIN	**85**
MODE	**X-Y**
V SCALE	**0.2**
H SCALE	**0.4**
FILTER DIFF	**01**
SCREEN SET	**AUTOCLEAR 0**

(6) Press the **BAL** button to null the instrument.

(7) Using the rocker switch on the probe controller, turn the rotating probe gun to the ON position at the slower of the two available speeds.

(8) Insert the probe coil into the calibration standard (P/N VM30889-C1A) adjacent to the 0.030" X 0.030" notch at the top of the appropriate diameter fastener hole. Adjust the **PRB GAIN** and **PHASE** to obtain a signal as shown in Figure C2.

(9) Change **MODE** to **TRG SWP** and press the **BAL** button to null the instrument.

NOTE: It may be necessary to rotate the position of the probe controller to obtain a similar signal position as shown in Figure C3.

(10) With the rotating probe coil still held adjacent to the 0.030" X 0.030" notch at the top of the appropriate diameter fastener hole, adjust **PRB GAIN**, **V SCALE**, **H SCALE,** and **PHASE** to obtain a signal height of approximately 98% as shown in Figure C3.

E. Inspection:

NOTE: The eddy current instrument must be recalibrated when probes are changed.

(1) Ensure instrument is calibrated as in accordance with Paragraph D. Perform ABHEC scan of all open holes in the upper and lower skin panels, stringers, attach angles and straps.

(2) To confirm suspected damage, conduct a redundant ABHEC backup procedure in accordance with Paragraph F.

F. Redundant Inspection (for confirmation only):

(1) Inspector Verification

(a) Wrong alignment

1 Reset and recalibrate the same equipment. The same inspector repeats the inspection. If crack is confirmed, complete the verification outlined below.

(b) Verification

1 Preferred Method – Different inspector repeats the inspection using the same equipment, after resetting and recalibrating the equipment.

2 Alternate Method No. 1 – Inspector re-inspects the area with an appropriate alternate method.

G. Mark and Report Damage:

(1) Report any damage detected by this inspection procedure to Lockheed Martin Aeronautics Company. Provide the following information of all damage detected:

(a) Aircraft Serial Number

(b) Center Wing Flight Hours (or Aircraft Flight Hours if center wing hours is unknown)

(c) Center Wing Equivalent Baseline Hours (EBH) calculated in accordance with Service Bulletin 82-788.

(d) Part number and description

(e) Location (Wing Station, Fuselage Station), and specific fastener hole location

(f) Length, depth and orientation of crack

(2) Refer to the Hercules Structural Repair Manual SMP 583 for repair instructions. Contact Lockheed Martin Aeronautics Company if the damage exceeds the repair limits defined in the Structural Repair Manual:

Telephone: (770) 494-9131
Fax: (770) 494-9122
E-Mail: hercules.support@lmco.com
Mail: Lockheed Martin Aeronautics Company
86 South Cobb Drive
Department 3E1M, Zone 0591
Marietta, GA 30063-0591, USA

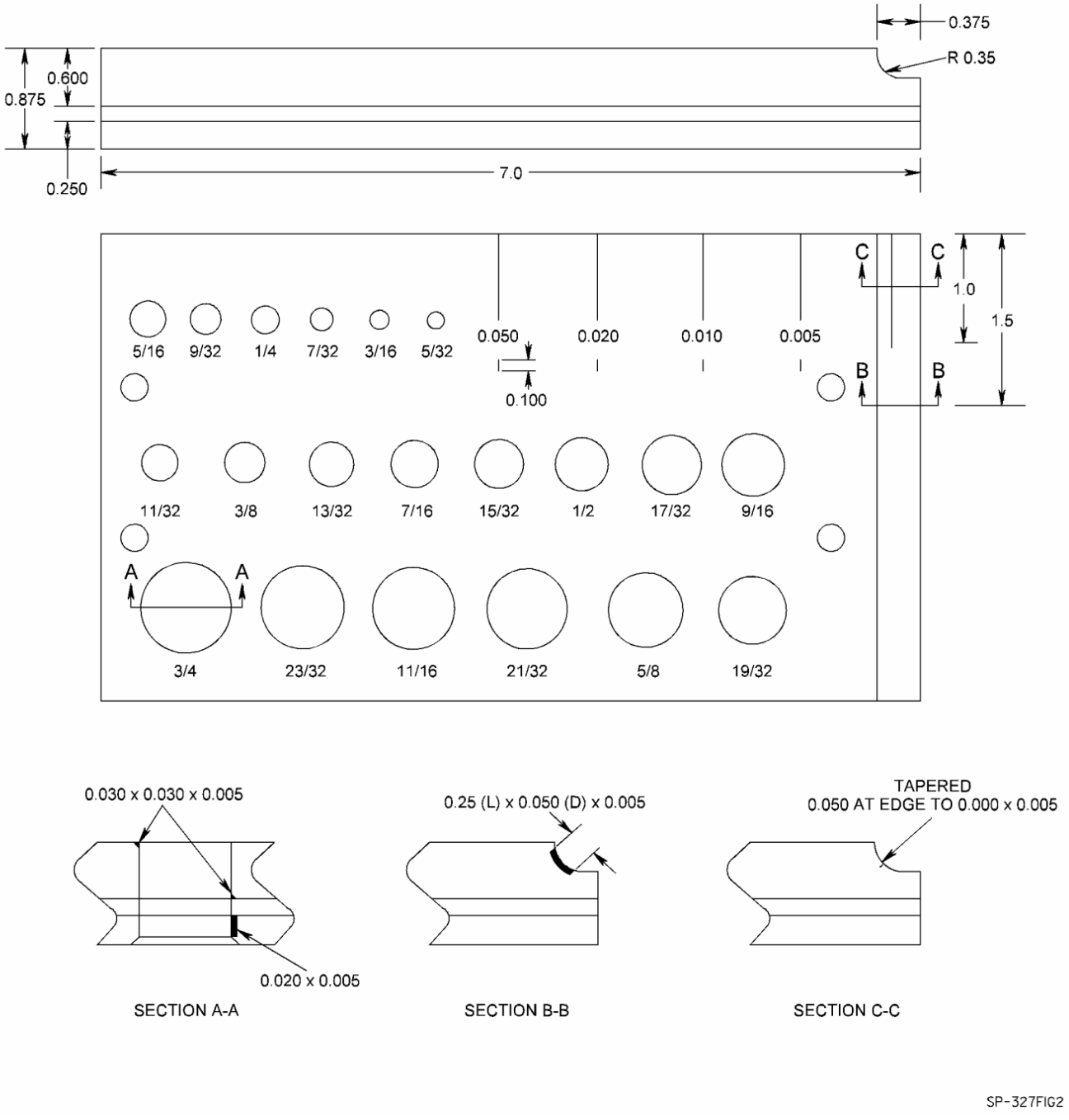

Figure C1 - General Purpose Eddy Current Calibration Standard 7075-T6 Aluminum

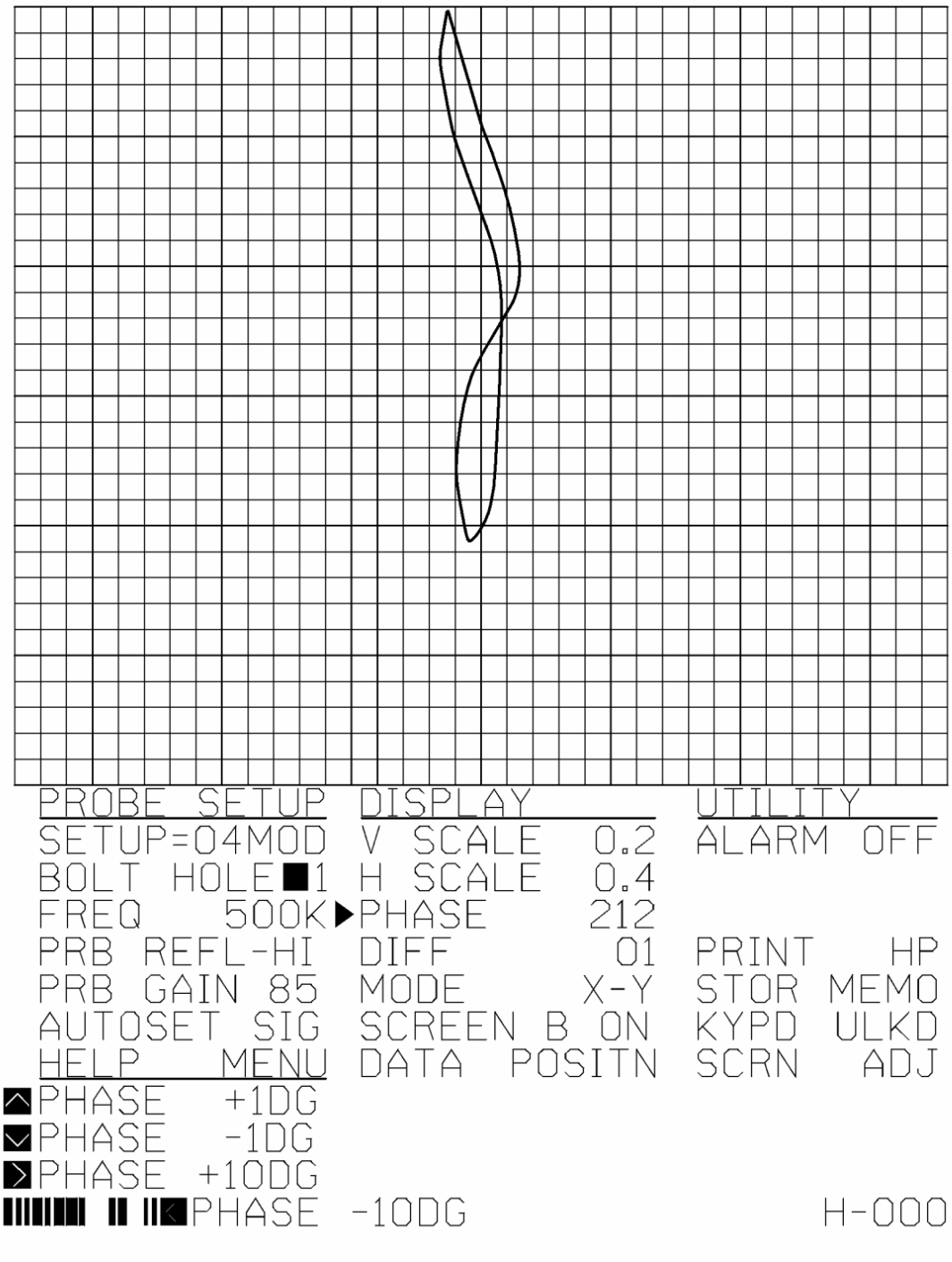

Figure C2 - Typical X-Y Signal Response from 0.030” X 0.030” Notch

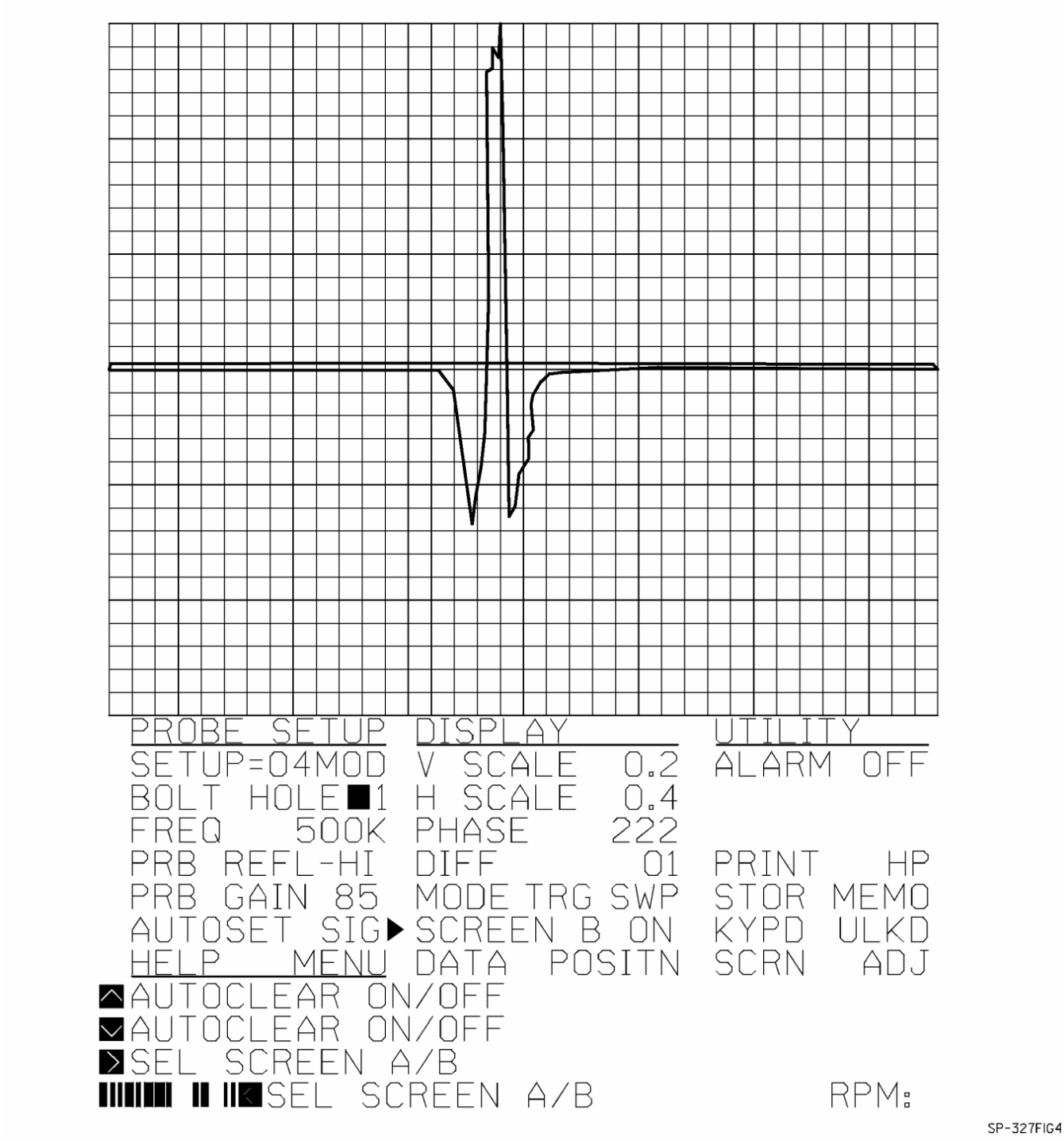

Figure C3 - Typical Time-based Signal Response from 0.030” X 0.030” Notch

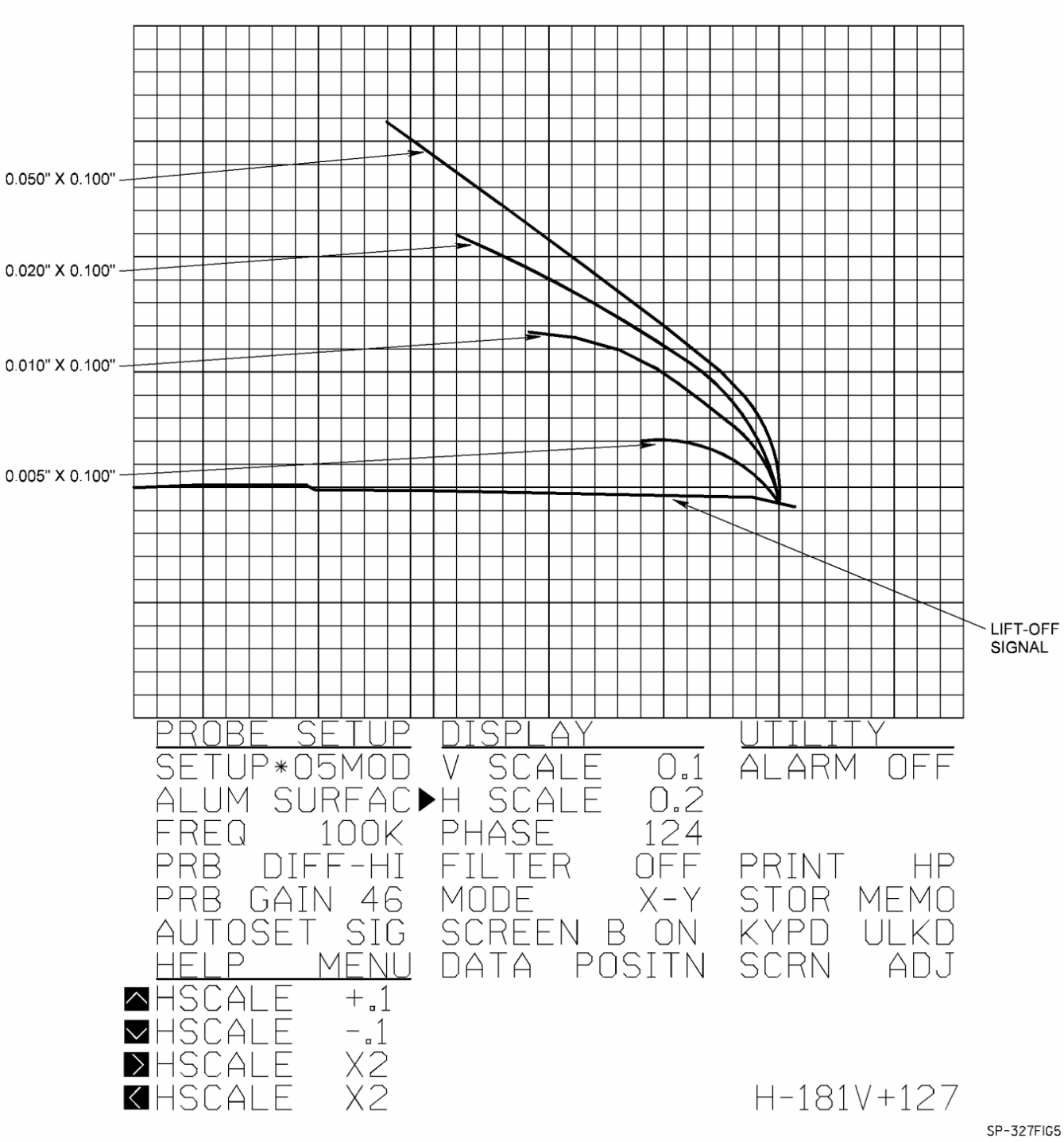

Figure C4 - Lift-off and Notch Signals