
September 1990

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National Aeronautics and Space Administration
George C. Marshall Space Flight Center
Marshall Space Flight Center, Alabama 35812

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DR No. 3-5
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ECS No. SS-1015

Thiokol CORPORATION
SPACE OPERATIONS

P.O. Box 707, Brigham City, UT 84302-0707 (801) 863-3511

Publications No. 91190
Flight Set 360L007 (STS-33R)
Field Joint Protection System,
Thermal Protection System, and
Systems Tunnel Components
Final Report
Volume VII

Prepared by:

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Stage Hardware Design Engineer

Approved by:

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Supervisor  System Integration Engineer
Stage Hardware Design

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Bruce Howard  Gary J. Stover
SR&QA  Program Manager

[Signature]
Data Management
ECS SS-1015

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P. H.  [Signature]
9-12-90  9-13-90
ABSTRACT

This report documents the performance of the thermal protection system, field joint protection system, and systems tunnel components of flight set 360L007 as evaluated by postflight hardware inspection.

The condition of both motors was similar to previous flights. Four aft edge strikes were noted on the ground environment instrumentation thermal protection system. The hits all left a clean substrate, indicating that the damage was caused by nozzle severance debris and/or water impact. No National Space Transportation System debris criteria for missing thermal protection system were violated.

Two problem reports were written against the field joint protection system. The first concerned two cracks in the K5NA closeout over the trunnion/vent valve location on the left-hand aft field joint. A similar condition was observed on Flight 5 (360H005B). The second problem report referred to a number of small surface cracks between two impact marks on the left-hand forward field joint. Neither area exhibited loose material or any abnormal heat effects, and they have no impact on flight safety.
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</table>
ACRONYMS

deg ............... degree
FJPS ............. field joint protection system
ft ............... feet
GEI ............. ground environment instrumentation
hr ............... hour
in. ............... inch
IPR ............. interim problem report
JPS ............. joint protection system
KSC ............. Kennedy Space Center
L ............... launch
LCC ............. launch commit criteria
LH ............. left hand
NSTS ........ National Space Transportation System
PEEL ........ Postflight Engineering Evaluation Limit
RH ............. right hand
RSRM ........ redesigned solid rocket motor
SRB ........ solid rocket booster
STS ........ Space Transportation System
TPS ........ thermal protection system
V ............... volt
°F ............... degrees Fahrenheit
INTRODUCTION

STS-33R was launched from Kennedy Space Center (KSC) on 22 Nov 1989. Two redesigned solid rocket motors (RSRM) were used and were designated 360L007A and 360L007B. The three field joints on each motor (total of six field joints) were protected by the field joint protection system (FJPS) (Figure 1). The FJPS is used to keep the field joint O-rings above the minimum launch commit criteria (LCC) temperature during the launch countdown, to keep rain water from entering the field joint, and to protect the joint components from aerodynamic heating during flight. The igniter-to-case joint on each RSRM was fitted with an igniter heater to keep the igniter seals above minimum LCC temperature requirements during launch countdown (Figure 2).

The ground environment instrumentation (GEI) and heater power cables are protected by the thermal protection system (TPS). The purpose of the TPS is to protect the GEI and heater systems from aeroheating during flight.

After solid rocket booster (SRB) separation and splashdown, the SRBs were recovered and towed to KSC's Hangar AF for postflight inspection and disassembly. Retrieval and tow-back were delayed 24 hr by high sea states. The FJPS, TPS, systems tunnel, and igniter heater installation inspections were performed per Postflight Engineering and Evaluation Plan TWR-50050, Vol I (Reference 1).
Figure 2. Igniter-to-Case Joint Heater Configuration
OBJECTIVE

The objective of this report is to document any heater anomalies during the launch countdown and any anomalies to the FJPS, TPS, or systems tunnel components during flight and recovery operations. This report will also address all squawks or problem reports initiated during postflight evaluation.
SUMMARY

Postflight assessment results indicate that all TPS and systems tunnel components were in very good to excellent condition (compared to previous flights) with typical flight heat effects and erosion. No squawks or problem reports were written against the TPS or systems tunnel. There were a total of four aft edge hits: three on the left-hand (LH) motor and one on the right-hand (RH) motor, with the largest missing piece of TPS cork measuring 2.5 by 2.5 by 0.5 inches. The hits all left a clean substrate, indicating that the damage was caused by nozzle severance debris and/or water impact. No Postflight Engineering Evaluation Limit (PEEL) requirements or National Space Transportation System (NSTS) debris criteria for missing TPS were violated.

Two anomalies were observed on the LH aft and LH forward field joints and were documented as Problem Reports PV-6-146407 and PV-6-146109, respectively. The anomaly in the LH aft field joint consisted of two circumferential cracks in the K5NA closeout over the trunnion/vent valve location. The cracks were about 2 in. long and did not exhibit loose material or any abnormal heat effects. The LH forward field joint had two small impact marks on the forward edge and a series of small surface cracks in between. These also showed no abnormal heat effects.
The joint protection system (JPS) heaters performed as expected and maintained the
field joint temperatures within the LCC required range during launch countdown.
Postflight inspection verified that the TPS, FJPS, and systems tunnel all performed as
designed, with typical flight heat effects and erosion. The two anomalies reported on
the FJPS did not exhibit loose material or any abnormal heat effects and had no
impact on flight safety or schedule.
5

DISCUSSION

5.1 PREFLIGHT HEATER CONTROL SYSTEM AND PERFORMANCE

The field joint heaters and igniter-to-case joint heaters performed nominally during the launch countdown. The igniter heaters were activated between L - 24 hr and L - 6 hr 20 minutes, and maintained the joints within the LCC temperature limits of 90° to 108°F at all times. However, the temperature control band was changed from 95° ±5°F to 95° ±1°F, resulting in more frequent cycling and better heater control.

The field joint heaters were activated between L - 11 hr 20 minutes and L - 1 minute, and maintained an acceptable 17°F sensor temperature range from 90° to 107°F during the LCC timeframe. Prior to launch, an LCC contingency was created to lower the minimum redline temperature at any field joint from 85° to 69°F in the event of a complete heater failure. An interim problem report (IPR) was written against the LH aft field joint heater, which read 290 V instead of the nominal 209 V. This IPR was dispositioned when it was determined that the voltage must have been nominal since the current reading was nominal. In addition, the heater circuit breaker was not tripped, as it would have been had the voltage actually been 290 V.

5.2 POSTFLIGHT INSPECTION OF FJPS, TPS, SYSTEMS TUNNEL, AND IGNITER HEATER INSTALLATION

The condition of both motors was similar to previous flight motors, with most of the heat effects occurring on the inboard side of the aft segments. These areas experience high aerodynamic heating normal to protuberance components. They also receive the high plume radiation and base recirculation heating induced by the adjacent SRB and space shuttle main engines on the aft-facing surfaces. There was slight charring of the TPS over the GEI cabling runs in this area, typical of previous flights.
5.2.1 Field Joint Protection System

The FJPS was in good condition overall. There were no signs of ablation on any of the JPS, with only slight paint blistering on the cork cover. The paint on the K5NA closeout aft of the cork was also slightly darkened and blistered, with occasional pitting. This condition was typical of previous flights and was probably due to aerodynamic heating and the result of nozzle severance debris and water impact.

Numerous small cracks were observed on the forward edge of the LH forward FJPS cork between 240 and 260 deg (Figure 3). Impact marks were noted on each side of the affected area approximately 3 ft apart. Problem Report PV-6-146407 was written against these cracks (Appendix A). The cracks measured approximately 0.50 in. axially by less than 0.10 in. radially and were within the current material acceptance requirements. The impact marks were most likely caused by a parachute float line. A limit was added to the PEEL stating that cracks in the FJPS that meet current acceptance criteria are acceptable and should not be reported.

Two circumferential cracks were found in the K5NA closeout over the trunnion/vent valve on the LH aft field joint at approximately 30 deg (Figure 4). The cracks were parallel (about 1.25 in. apart) and measured approximately 2.0 in. wide by less than 0.10 in. deep. The K5NA around the cracks was bulged out about 0.10 in. and could be depressed approximately 0.10 in. with hand pressure. Problem Report PV-6-146109 was written against these cracks (Appendix A). This condition was noted on a previous flight (360H005), and it was determined that a vacuum (due to vent valve operation) developed under the moisture seal during descent. This caused the moisture seal to be pulled down over the pin retainer band trunnion. The resulting stress in the K5NA induced a split. Since the condition occurred after SRB separation, there is no impact on flight safety and no corrective action was taken.

A 4- by 2-in. local blister was observed on the LH center field joint at 45 deg. There was peeling of the Hypalon paint in the area and cork was eroded from the surface approximately 0.05 to 0.10 in. deep. This damage was a first-time occurrence and was probably caused by burning debris from the nozzle severance system. No squawks or problem reports were written against this condition.
Figure 3. Impact Marks on FJPS Cork (LH forward field joint)
Figure 4. Splits in K5NA Ablation Compound
(LH aft field joint)
5.2.2 Thermal Protection System

TPS performance was considered to be excellent during flight operation, with typical heat effects and no ablation. There were no in-flight anomalies, squawks, or problem reports written against the TPS.

There were a total of four aft edge hits: three on the LH forward center segment and one on the RH forward segment. The TPS cork pieces that were missing all left a clean substrate, indicating that the hits were caused by nozzle severance debris and/or water impact. The largest GEI cork piece missing was approximately 2.5 by 2.5 by 0.5 in., or 3.1 in.\(^3\). This piece was located at Station 691 on the RH forward segment at approximately 240 deg. No PEEL requirements or NSTS debris criteria for missing TPS were violated.

5.2.3 Systems Tunnel

The cork TPS adjacent to the systems tunnel floor plate was in excellent condition. There was very little paint blistering, and all K5NA closeouts over cables and tunnel seams were in excellent condition. No in-flight anomalies, squawks, or problem reports were written against the systems tunnel.

5.2.4 Igniter Heater and Forward Dome Power Cable Installation

Postflight inspection of the igniter heater installation and power cables revealed no anomalies. The igniter heater, cork, and band clamp were removed and inspected at Hangar AF; no anomalies were noted.
6

REFERENCES


Appendix A

LH Aft Field Joint Anomaly Documentation
## POSTFIRE OBSERVATION RECORD (PFOR) A-4

### Field Joint External Insulation Condition

<table>
<thead>
<tr>
<th>Motor No.: 360L007</th>
<th>Side: Left (A)</th>
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<tr>
<td>Assessment Engineer(s): T. Morgan, S. Hicklin</td>
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### Field Joint External Insulation Observations:

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<td>B. Missing TPS Material &gt; 0.7 cu. in. Due To Ascent/Motor Operation (TPSVD)?</td>
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<td>C. Missing TPS Material &gt; 0.7 cu. in. Due To Reentry/Debris/Water Impact (TPSDM)?</td>
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<tr>
<td>D. Unbonds/Cracks (DEBND)?</td>
<td>✔</td>
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<tr>
<td>E. Evidence of Water Leakage From Field Joint (WATER)?</td>
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<td>F. Missing/Unbonded Vent Valves (MISSG)?</td>
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(FWD, CTR, and AFT Joints only.)

### Record the following if any of the above conditions exist:

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<tr>
<td>DEBND</td>
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<td>~ 45</td>
<td>2</td>
<td>N/A</td>
<td>&lt; .10</td>
<td>N/A</td>
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### Notes / Comments

1. CRACKS IN KENNA CLOSEOUT OVER TRUNNION

Clarification sheet(s) attached? no A-4B yes (Provide clarification number(s).)
Aft Segment TPS Clarification Form

Motor No.: 360L007
Side: √ Left (A) □ Right (B)
Date: 11/26/89

Assessment Engineer(s): T. MORGAN, S. HICKEN

Sketch Aft Segment TPS Observations Below:

- AFT FIELD JOINT
- SEE SKETCH BELOW
- APPEARS 70% OF AFT EDGE OF WEATHER SEAL WAS UNBONDED
- RUST PRESENT ON METAL SURFACE
- 2" LONG CRACK/DEPRESSION OVER TRUNION
- 30-35° KNEA CUSEOUT C ~ 45°
- 1/4"

Clarification Number: A-48

Corresponding Comment Number(s): __________
# SRB/SRM POSTFLIGHT HARDWARE ASSESSMENT
## SQUAWK SHEET

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<td>33</td>
<td>S. HICKEN / THIOKOL</td>
<td>26 NOV 91 12:00</td>
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<td>The left hand aft field joint trimmion location at 45° which was pulled in with K5NA had two cracks. The cracks were parallel (i.e. 0.25 inches apart) and extended 2 inches circumferentially. The cracks were opened approximately 0.1 inch. The material between the cracks could be depressed by moderate thumb pressure.</td>
</tr>
</tbody>
</table>

### ASSESSMENT TEAM CONCURRENCE

- **CONTRACTOR ASSESSMENT ENGINEER**: Steve Hicken
- **MSFC ASSESSMENT ENGINEER**: DeL. H. Geering

### EXECUTIVE BOARD REMARKS

- **PR REQUIRED**: 
- **PR NOT REQUIRED**: 

### APPROVALS

- **CONTRACTOR BOARD MEMBER/DATE**: 
- **BOARD CHAIRMAN/DATE**: 

---

**Page**: 1 of 1

---

**DOCUMENT**: A3

**TWR-17546**: VOL. VII
### POSTFIRE ANOMALY RECORD (PFAR)

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### TITLE
CRACK IN K5NA CLOSEOUT OVER JPS TRUNNION

### CLASSIFICATION

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### PART NUMBER
1U76803-01

### SERIAL NUMBER
N/A

### PART DESCRIPTION
FIELD JOINT PROTECTION SYSTEM

### REPORTED BY
S. V. HICKEN
THermal Insulation Design Engineering / 11/26/89

### RESPONSIBLE COMPONENT TEAM
JPS / G. L. STEPHENS

### RESPONSIBLE PROJECT ENGINEER
R. S. JENSEN
SYSTEMS INTEGRATION ENGINEERING

### RESPONSIBLE DESIGN ENGINEER
C. I. PROKOP
STAGE HARDWARE DESIGN

### DESCRIPTION
Two circumferential splits were found in the K5NA on the aft field joint at approximately 30 degrees measuring approximately 2.0 inches wide by 0.10 inch deep. The splits were about 1.25 inches apart. The K5NA around the splits was bulged out approximately 0.10 inch, was spongy, and could be depressed approximately 0.10 inch with hand pressure.

### JUSTIFICATION OF CLASSIFICATION (POSTFIRE ENGINEERING EVALUATION LIMITS)
The K5NA split occurred during descent. This condition was noted on a previous flight (360H005) and has no impact on flight schedule or safety. No new corrective action will be implemented.

### CAUSE
Vacuum under the moisture seal during descent caused the moisture seal to be pulled down over the pin retainer band trunnion. The resulting stress in the K5NA induced a split.

### RECOMMENDED CORRECTIVE ACTION
None.

### ANOMALY APPROVAL SIGNATURE
/S/S. T. MUNSON 12/13/89

### OBSERVATION/ANOMALY APPROVAL SIGNATURES
PE: /S/R. S. JENSEN 12/20/89
PM: /S/G. L. STEPHENS 01/05/90

### RESULTS OF RECOMMENDED CORRECTIVE ACTION
N/A

### REPORT RESULTS TO RPRB?
YES  NO

### RPRB CLOSURE SIGNATURE
/S/S. T. MUNSON 01/05/90

### OBSERVATION/ANOMALY CLOSURE SIGNATURE
PM: /S/G. L. STEPHENS 01/05/90

### ORIGINATION DATE
12/13/89

### REQUIRED STATUS DATE
12/15/89

### PR CLOSURE DATE
01/05/90

### PFAR CLOSURE DATE
01/05/90

REV. 3/20/89

TWR-17546 VOL. VII

Page A-4
PR CLOSURE APPROVAL

Engineering Approval

Signature

W. L. Hart

Date

2/6/90

Quality Assurance Approval

Signature

L. J. Johnson

Date

2/13/90

N.A.S.A. Resident Q.A. Approval

Signature

J. O. Lewis

Date

2/13/90

N.A.S.A. R.M.O. Manager Approval

Signature

E. J. Wozniakowski

Date

2/13/90

N.A.S.A. S.R.M. Chief Engineer Approval

Signature

K. Jones for L. Jones

Date

2/26/90
1. DETECTED DURING
2. OPEN ASSESSMENT
3. WORK AREA
4. END ITEM CONTROL NUMBER

5. WORK UNIT CODE
6. PART/PROG NAME
7. PART/PROG NO.
8. SER./REV NO.
9. QTY

10. FSCM/VENDOR
11. NHA/PN/TAPE/DISC ID.
12. STS # EFF.
13. REPORTED BY (NAME/ORG)
14. DATE

15. SOFTWARE PROBLEM LOCATOR

16. ITEM
17. PROBLEM DESCRIPTION

18. CRIT. SKILLS
19. ENG. CHANGE REQ.
20. CONSTRAINTS
21. TECH. CONTR
22. RESP ORG.

23. WEIGHT REQD.
24. RETEST REQD.
25. HAZARDOUS OP
26. MR REQD
27. TIME/CYCLE
28. FRACTURE CRIT

29. ITEM
30. DISPOSITION/CAUSE/CORRECTIVE ACTION

31. TECH.
32. SYSTEM RESTORED
33. FINAL ACCEPT.

34. DATA CODE
35. REPL. S/N
36. RELATED REPORTS

---

L1/H AFT FIELD TRUNNION LOCATION AT 45° WHICH WAS POTTED IN NITH KSNA HAVE TWO CRACKS. THE CRACKS WERE PARALLEL (1.25 INCHES APART) AND EXTENDED (O.75 INCHES CIRCUMFERENCE). THE CRACKS WERE OPENED APPROX 0.1 INCH. THE MATERIAL BETWEEN THE CRACKS COULD BE DEPRESSED BY MODERATE THUMB PRESSURE.

REF: SQUAWK 23-030

SEE PG 2 FOR DISPO
### 1.1 TRANSFER THIS PR TO THIOXOL CORP

**RECORD TRACKING NUMBER**

**TRACKING NUMBER:** 360/0074-03

**ACCEPTED BY:**

1/23/89

### SUMMARY CLOSURE

PR WAS TRANSFERRED TO THIOXOL CORP

### 1.2 CLOSE THIS PR

**CSS CSE:** Robert Ramm 12/22/89

**NASA CSE:** Brenda Haney 7/24/89

**THI CSE:** Mike Reader 11/29/89

**SPC CSE:** Mike Buff 11/29/89
Appendix B

LH Forward Field Joint Anomaly Documentation
**Thickol CORPORATION**

**SPACE OPERATIONS**

**POSTFIRE OBSERVATION RECORD (PFOR) A-4**

**Field Joint External Insulation Condition**

<table>
<thead>
<tr>
<th>Motor No.:</th>
<th>360L007</th>
<th>Side: Left (A)</th>
<th>Date: 11/26/19</th>
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</table>

Assessment Engineer(s): T. Mokgan, S. Hicken

**Joint**: Forward (FWD)

**Field Joint External Insulation Observations**:

<table>
<thead>
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<th>Condition</th>
<th>Yes</th>
<th>No</th>
<th>Comment #</th>
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<tr>
<td>A. Charred/Heat Affected Material (HTAFF)?</td>
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<td>✓</td>
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<tr>
<td>B. Missing TPS Material &gt; 0.7 cu. in. Due To Ascent/Motor Operation (TPSVD)?</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>C. Missing TPS Material &gt; 0.7 cu. in. Due To Reentry/Debris/Water Impact (TPSDM)?</td>
<td>✓</td>
<td></td>
<td></td>
</tr>
<tr>
<td>D. Unbonds/Cracks (DEBND)?</td>
<td>✓</td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>E. Evidence of Water Leakage From Field Joint (WATER)?</td>
<td></td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>F. Missing/Unbonded Vent Valves (MISSG)?</td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

(FWD, CTR, and AFT joints only.)

Record the following if any of the above conditions exist:

<table>
<thead>
<tr>
<th>Condition (Observation Code)</th>
<th>Starting Location (in.)</th>
<th>Ending Location (in.)</th>
<th>Starting Degree Location (deg.)</th>
<th>Ending Degree Location (deg.)</th>
<th>Circumferential Width (in.)</th>
<th>Axial Length (in.)</th>
<th>Radial Depth (in.)</th>
<th>Volume (in.³)</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEBND</td>
<td>N/A</td>
<td>N/A</td>
<td>2.40</td>
<td>2.60</td>
<td>~ 3 ft.</td>
<td>~ .50 in.</td>
<td>&lt; .16 in.</td>
<td>N/A</td>
</tr>
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</table>

| Notes / Comments | |
|------------------| |
| 1. NUMEROUS SMALL CRACKS ON FWD EDGE OF TPS CORK. | |
| TWO IMPACT MARKS (POSSIBLE PARACHUTE FLOAT LINE) ON EACH SIDE OF AFFECTED AREA. | |

Clarification sheet(s) attached? __ no ___ A-4A yes (Provide clarification number(s).)
Forward Segment TPS Clarification Form

Motor No.: 360L007  Side: ☑ Left (A) ☐ Right (B)  Date: 11/26/89
Assessment Engineer(s): T. Morgan  S. Hackel

Sketch Forward Segment TPS Observations Below:

Clarification Number: A-4A  Corresponding Comment Number(s): 1

REV.  

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SEC PAGE  

B-2
## SRB/SRM Postflight Hardware Assessment Squawk Sheet

### OPEN ASSESSMENT
- **Location:** On Dock

### WORK AREA CODE
- **Work Area Code:** Final
- **Insulation:** Field Joint Protection
- **System:** 1076 803-01

###平方 SHEET
- **Serial Number:** 33
- **Reported by (Name/Title):** S. Hicken
- **Photo Organization:** USB/AMTI

### DATE/TIME
- **Date/Time:** Nov 21/12:00

### PROBLEM DESCRIPTION
The left hand forward field joint forward edge from 240°-260° exhibited two possible impact marks approximately 3 feet apart. Numerous small surface cracks were on the forward facing edge between the marks.

### ASSESSMENT TEAM CONCLUSION
- **Assessment Engineer:** S. Hicken
- **MSFC Assessment Engineer:** Dave W.

### EXECUTIVE BOARD DISPOSITION
- **Required:** [ ]
- **Not Required:** [ ]

### EXECUTIVE BOARD REMARKS

---

**Contractor Board Member/Date:**

**Boad Chairman/Date:**

---

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### POSTFIRE ANOMALY RECORD (PFAR)

<table>
<thead>
<tr>
<th>1. PFAR NUMBER</th>
<th>3. INSPECTION LOCATION</th>
<th>4. REFERENCE SQUAWK NUMBER</th>
<th>5. REFERENCE PR NUMBER</th>
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<tbody>
<tr>
<td>360L007A-05</td>
<td>KSC X T-24/T-97</td>
<td>33-031</td>
<td>PVG-166407</td>
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<table>
<thead>
<tr>
<th>2. COMPONENT PROGRAM TEAM</th>
<th>6. REFERENCE IFA NUMBER</th>
<th>7. REFERENCE SPR NUMBER</th>
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<tbody>
<tr>
<td>JPS</td>
<td>N/A</td>
<td>N/A</td>
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</table>

### 8. TITLE
IMPACT MARKS/SURFACE CRACKS ON FORWARD FIELD JOINT FJPS

### 9. CLASSIFICATION

<table>
<thead>
<tr>
<th>OBSERVATION</th>
<th>MINOR ANOMALY</th>
<th>X</th>
<th>MAJOR ANOMALY</th>
<th>X</th>
<th>CRITICAL ANOMALY</th>
</tr>
</thead>
</table>

### 10. JUSTIFICATION OF CLASSIFICATION
This is a first-time occurrence but this condition imposes no impact on flight safety or schedule.

### 11. PART NUMBER | 12. SERIAL NUMBER | 13. PART DESCRIPTION
1U76803-01                | N/A                        | FIELD JOINT PROTECTION SYSTEM

### 14. REPORTED BY (NAME / ORGANIZATION / OBSERVATION DATE)
S. V. NICKEN/ THERMAL INSULATION DESIGN ENGINEERING / 11/26/89

### 15. RESPONSIBLE PROGRAM MANAGER (NAME / ORGANIZATION)
G. L. STEPHENS/JPS PROGRAM MANAGEMENT

### 16. RESPONSIBLE POSTFIRE ENGINEER (NAME / ORGANIZATION)
G. S. NIELSON/ POSTFIRE HARDWARE ENGINEERING

### 17. RESPONSIBLE INTEGRATION ENGINEER (NAME / ORGANIZATION)
R. S. JENSEN/ SYSTEMS INTEGRATION ENGINEERING

### 18. RESPONSIBLE ACTION EE (NAME / ORGANIZATION)
C. L. PROKOP/ STAGE HARDWARE DESIGN

### 19. DESCRIPTION (ATTACH PFAR, FIGURES, PHOTOGRAPHS, ETC.)
Numerous small cracks were observed on the forward edge of the forward field joint FJPS cork from 240-to-260 degrees. Impact marks were noted on each side of the affected area approximately 3 feet apart. The cracks measured approximately 0.50 inch axially by less than 0.10 inch radially.

### 20. HISTORY
None. This is the first time that cracks of this type have been reported.

### 21. CAUSE
Cracks of this size meet the current material acceptance requirements. The impact marks were most likely caused by a parachute float line.

### 22. CORRECTIVE ACTION
Add a limit to the PEEL stating that cracks in the FJPS that meet current acceptance criteria are acceptable and should not be reported.

### 23. RESULTS
TWR-500050, Vol. I, Rev. C will state "Cracked cork or KSNA with no missing material - Acceptable".

### 24. REPORT RESULTS TO RPRB?
YES

### 25. RPRB MEETING DATES
ORIGINATION: 12/13/89
CLOSURE: N/A

### 26. APPROVAL THROUGH CORRECTIVE ACTION

<table>
<thead>
<tr>
<th>RPRB SECRETARY</th>
<th>DATE</th>
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<tbody>
<tr>
<td>/S/S. T. MUNSON</td>
<td>12/13/89</td>
</tr>
<tr>
<td>/S/R. S. JENSEN</td>
<td>12/20/89</td>
</tr>
<tr>
<td>/S/G. L. STEPHENS</td>
<td>01/05/90</td>
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</table>

PM: [Signature]

### 27. CLOSURE

<table>
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<tr>
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</table>

PM: [Signature] DATE: 10/July/90

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Page

REV. 2/1/90
PR CLOSURE APPROVAL

Ref. P.F.A.R. Number: 360L007A-05

Engineering Approval

Signature

[Signature]

Date

2/16/90

Quality Assurance Approval

Signature

[Signature]

Date

2/13/90

N.A.S.A. Resident O.A. Approval

Signature

[Signature]

Date

2/13/90

N.A.S.A. R.M.O. Manager Approval

Signature

[Signature]

Date

2/13/90

N.A.S.A. S.R.M. Chief Engineer Approval

Signature

[Signature]

Date

2-20-90
**Items:**

1. **DISPOSITION/CAUSE/CORRECTIVE ACTION**

   * EXHIBITED TWO POSSIBLE FRACHE MARKS APPX. 3 FEET APART. NUMEROUS SMALL SURFACE CRACKS WERE ON THE FORWARD FACED EDGE BETWEEN THE HAPS.

   **REF SQUAWK 33-031**

2. **DATA CODE**

   * B0BP

3. **RC ACTION REQD**

   * NO

4. **RC CONSTRAINT**

   * (SIGNATURE DATE)

5. **RC CLOSURE**

   * (SIGNATURE)

---

**KSC FORM 2.151 (REV. 12/81)**
1. TRANSFER THIS PR TO THI CORP.

   TRACKING NO: 560-007A-05

   ACCEPTED BY: [Signature] [Date]

2. SUMMARY CLOSURE

   PR WAS TRANSFERRED TO THI OR CORP.

3. CLOSE THIS PR

   KSC SE: [Signature] [Date]

   NASA SE: [Signature] [Date] [Remarks]

   THI CSS: [Signature] [Date]

   SPC DE: [Signature] [Date]
## DISTRIBUTION

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<tr>
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