FUV Detector System
Quality Assurance/Configuration Management

Mr. Christopher Scholz
EAG QA Manager

FUV Documentation Status

- Latest Documentation Available at http://ozma.ssl.berkeley.edu/~eagcos
- COS-UCB-001 Interface Control Document released April 22, 1999
- COS-UCB-001 Rev A in Signature Cycle
- COS-UCB-002 QA Implementation Plan Released December 1, 1999
- COS-UCB-003 CM Plan released December 23, 1999
- COS-UCB-004 FSW Requirements Document released August 26, 1999
- COS-UCB-006 Performance Verification Plan released January 4, 1999
- COS-UCB-007 Environmental Test Plan released April 21, 2000
- COS-UCB-008 Flight Software Test Plan in signature cycle
- COS-UCB-009 Flight Software Design Document draft release for review

EAG COS Documents

- UCB-COS-DOC-1027 Failure Modes & Effects Analysis & Critical Items List
- UCB-COS-DOC-1076 Detector Verification Matrix
- UCB-COS-DOC-1111 COS CPU FPGA Design Review Package
- UCB-COS-DOC-1114 COS Counter Actel Design Review Package
- UCB-COS-DOC-1115 COS Round Robin Actel Design Review Package
- UCB-COS-DOC-1118 COS EGSE Startup Procedure

Quality Assurance – COS Procedures

- UCB-C0S-PRO-1010 Pre and Post Vibrational Functional Test Procedure for the Prototype COS FUV Detector
- UCB-COS-PRO-1011 Procedure for Qualification Vibration Testing of the Prototype COS FUV Detector
- UCB-COS-PRO-1012 COS Prototype DVA Interior Assembly Procedure
- UCB-COS-PRO-1045 COS Anode Inspection and Testing Procedure
- UCB-COS-PRO-1046 COS Anode Polyimide Layers Fabrication Procedure
- UCB-COS-PRO-1081 COS Brazed Body High Potting Procedure
- UCB-COS-PRO-1085 COS HVFM Acceptance Verification Tests
- UCB-COS-PRO-1093 COS Amplifier Functional Test Procedure
- UCB-COS-PRO-1096 DCE-A Circuit Card Assy Safe to Mate Procedure
- UCB-COS-PRO-1097 DCE-B Circuit Card Assy Safe to Mate Procedure
- UCB-COS-PRO-1098 DCE-C Circuit Card Assy Safe to Mate Procedure
- UCB-COS-PRO-1099 COS LVPC Safe to Mate Procedure
- UCB-COS-PRO-1101 COS Amplifier Voltage Margin Test
- UCB-COS-PRO-1102 DCE-A,B & C Circuit Card Assy Stackup Functional Test
- UCB-COS-PRO-1103 COS Flight Hardware Bakeout (LVPC, HVPS and HVFM
- UCB-COS-PRO-1099 COS LVPC-HVPS Safe to Mate Procedure

Quality Assurance – COS Procedures (2)

- UCB-COS-PRO-1109 COS DCE-B CPU Decoder Actel Test Procedure
- UCB-COS-PRO-1110 COS DEB to EGSE Harnessing Procedure
- UCB-COS-PRO-1112 DCE to TDC and HK Simulator Harnessing Procedure
- UCB-COS-PRO-1113 COS DCE-A Functional Test Procedure
- UCB-COS-PRO-1117 Ion Pump Assembly Integration Procedure
- UCB-COS-PRO-1120 COS TDC First Power On Procedure
- UCB-COS-PRO-1121 COS TDC Functional Test Procedure
- UCB-COS-PRO-1122 DCE Power On Procedure for External Power
- UCB-COS-PRO-1123 COS DCE Voltage Margin Procedure
- UCB-COS-PRO-1124 COS DCE-C Functional Test Procedure
- UCB-COS-PRO-1125 COS DCE Frequency Margin Test Procedure
- UCB-COS-PRO-1126 COS DCE-C Board Functional Test Procedure
- UCB-COS-PRO-1129 COS FUV Detector Power On/Off Procedure
- UCB-COS-PRO-1131 COS TDC System Functional Test Procedure
- UCB-COS-PRO-1132 COS Bakeplate Fiducials Optical Metrology Procedure
- UCB-COS-PRO-1133 COS MCP Surface to Backplate Fiducials Optical Metrology Procedure

Quality Assurance – COS Lists & AIT's

- UCB-COS-LST-1003 EAG COS Materials and Processes List
- UCB-COS-LST-1033 COS Amplifier Assembly Parts List
- UCB-COS-LST-1066 DCE-A Parts List
- UCB-COS-LST-1067 DCE-B Parts List
- UCB-COS-LST-1068 DCE-C Parts List
- UCB-COS-LST-1071 TDC-X Parts List
- UCB-COS-LST-1072 TDC-Y Parts List
- UCB-COS-LST-1105 COS All Parts List

- UCB-COS-AIT-1030 COS Amplifier Assembly Instructions
- UCB-COS-AIT-1047 COS Anode Assembly Instructions
- UCB-COS-AIT-1073 DCE-A Assembly Instructions
- UCB-COS-AIT-1074 DCE-B Assembly Instructions
- UCB-COS-AIT-1075 DCE-C Assembly Instructions
- UCB-COS-AIT-1082 TDC-X Assembly Instructions
- UCB-COS-AIT-1083 TDC-Y Assembly Instructions

Q.A. – COS Plans, Specifications & Reports

- UCB-COS-PLN-1014 COS Fracture Control Plan

- UCB-COS-RPT-1004 COS Mass Properties Report
- UCB-COS-RPT-1005 EAG COS DVA Prototype Vibration Report
- UCB-COS-RPT-1015 COS FUV Power Budget Report
- UCB-COS-RPT-1086 Detector Backplate FEM Analysis
- UCB-COS-RPT-1128 COS FUV DCE Power-On-Reset Circuit Test Report

- UCB-COS-SPC-1028 COS Identification, Marking and Packaging Specification
- UCB-COS-SPC-1048 Amplifier PCB to Box Wiring Diagram
- UCB-COS-SPC-1130 COS EGSE Test Directory Convention Specification

Quality Assurance – EAG Documents

- EAG Procedures, Specifications and Reports
  - UCB-EAG-SPC-1006 Autocad Standards and Policies
  - UCB-EAG-PRO-1018 Fabrication Procedure for Inductors (Shielding Beads)
  - UCB-EAG-SPC-1034 EAG Torque Specifications
  - UCB-EAG-PRO-1084 Preliminary Vacuum Bake Out Procedure
  - UCB-EAG-RPT-1092 Assembly Modification Report Form
  - UCB-EAG-PRO-1094 Thermal Vacuum Chamber Cleaning
  - UCB-EAG-PRO-1118 Fabrication Procedure for Heatsink Bonding of Transistors
  - UCB-EAG-PRO-1127 Baffle Surface Treatment

- Configuration Management
  - Engineering Changes –EC's
    - Notice – Notification of a change to an existing design, drawing or document
    - Request – A change in status requested by a non UC source – consultant, CASA, BATC, GSFC
    - Order – A change in status needed to meet new project specifications
  - Manufacturing Orders – MO's
    - Implementation of changes to an assembly
    - Specification of work to be performed i.e. replacement or installation of components
    - Tracking of work to be performed, its completion and closeout of said work
  - Problem Failure Reports – PFR's
    - Class 3 – UCB Internal Review and Disposition
    - Class 2 – Subsystem PFR, CU/UCB MRB, Minor Cost or Schedule Impact
    - Class1 – Project Level PFR GSFC/CU/UCB MRB Major Cost or Schedule Impact

Quality Assuarance – Engineering Changes

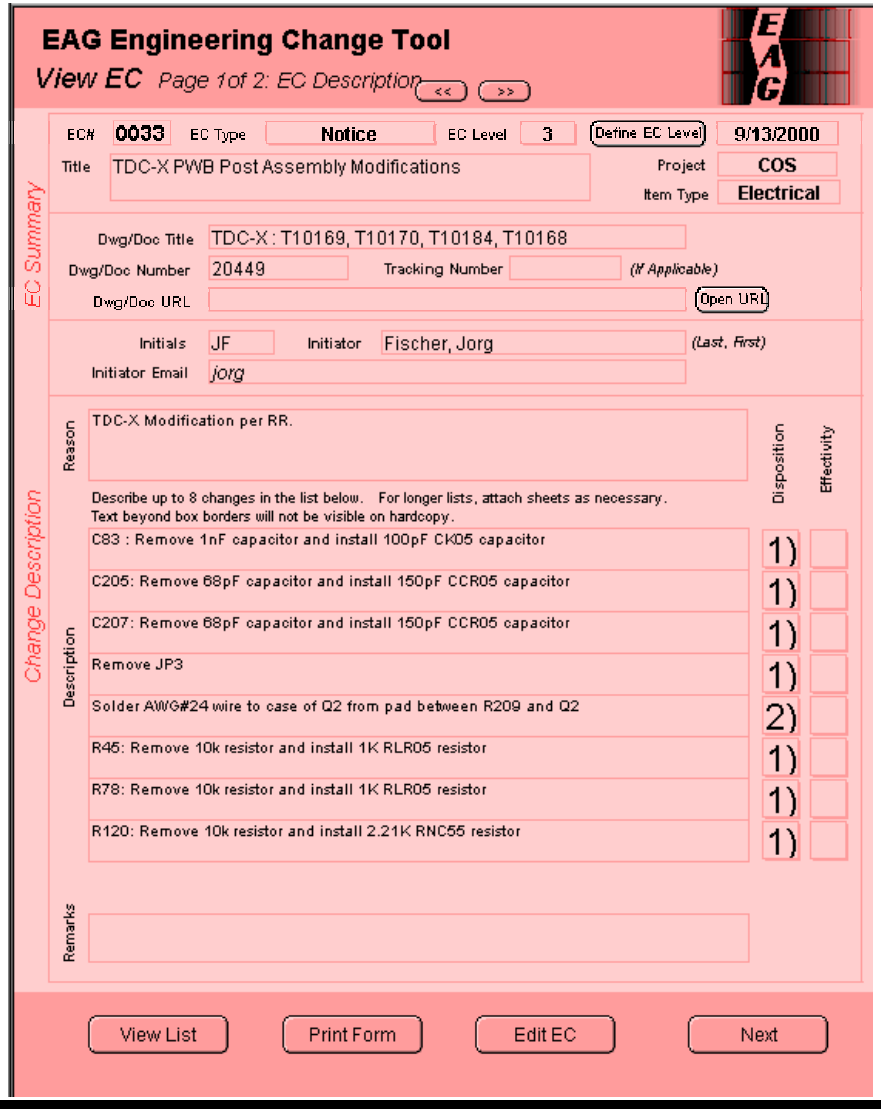
	EC	Level	Title
•	EC0001	3	Upper Ceramic Spacer Drawing Correction
•	EC0002	3	QE Grid Frame Drawing Change
•	EC0005	3	COS FUV/ICD revision from 'Initial' to Revision A
•	EC0006	3	Pull-up/down termination of RS422 H/W Reset Line
•	EC0010	3	COS Amplifier Trim Adjustments
•	EC0011	3	COS DCE-B Post Assembly Modifications
•	EC0016	2	Remove RS422 Receiver Pull-up/down Resistors
•	EC0018	3	Charge Amplifier Oscillator Modification
•	EC0021	3	TDC-Y BCCLK modification
•	EC0025	3	COS AMP Low Temperature Oscillation Fix
•	EC0027	3	Replace 8051 Port 1 Pulldown Resistors
•	EC0028	1	Remove COS FUV DCE "Prom On" Function
•	EC0029	3	TDC-X Resistor Value Replacement
•	EC0030	3	Change DCE-B 8051 clock from 16 Mhz to 8 Mhz

Quality Assuarance – Engineering Changes (2)

	EC	Level	Title
•	EC0033	3	TDC-X PWB Post Assembly Modifications
•	EC0034-36	3	TDC-Y PWB Modifications
•	EC0038	3	TDC-X Delayline
•	EC0039	3	TDC-Y Delayline
•	EC0042	3	DCE-A Actel Reset for TDC
•	EC0043	3	COS TDC-X Image stretch and shift trim values
•	EC0044	3	COS TDC-Y Image stretch and shift trim values
•	EC0045	3	TDC-Y Regulator
•	EC0046	3	TDC-Y Feedthrough Filter
•	EC0047	3	TDC-X Feedthrough Filter
•	EC0048	3	TDC-X Enlarge adjustment range of image size
•	EC0049-50	3	TDC-Y Enlarge adjustment range of image size
•	EC0051	2	COS DCE POR circuit enhancements
•	EC0052	2	COS DCE-TDC termination resistors

Quality Assurance – Sample EC's

Center for Astrophysics and Space Astronomy



EAG Engineering Change Tool

View EC Page 1of 2: EC Description << >>

EC# 0033 EC Type Notice EC Level 3 Define EC Level 9/13/2000

Title TDC-X PWB Post Assembly Modifications Project COS Item Type Electrical

EC Summary

Dwg/Doc Title TDC-X : T10169, T10170, T10184, T10168

Dwg/Doc Number 20449 Tracking Number (If Applicable)

Dwg/Doc URL Open URL

Initials JF Initiator Fischer, Jorg (Last, First)

Initiator Email jorg

Change Description

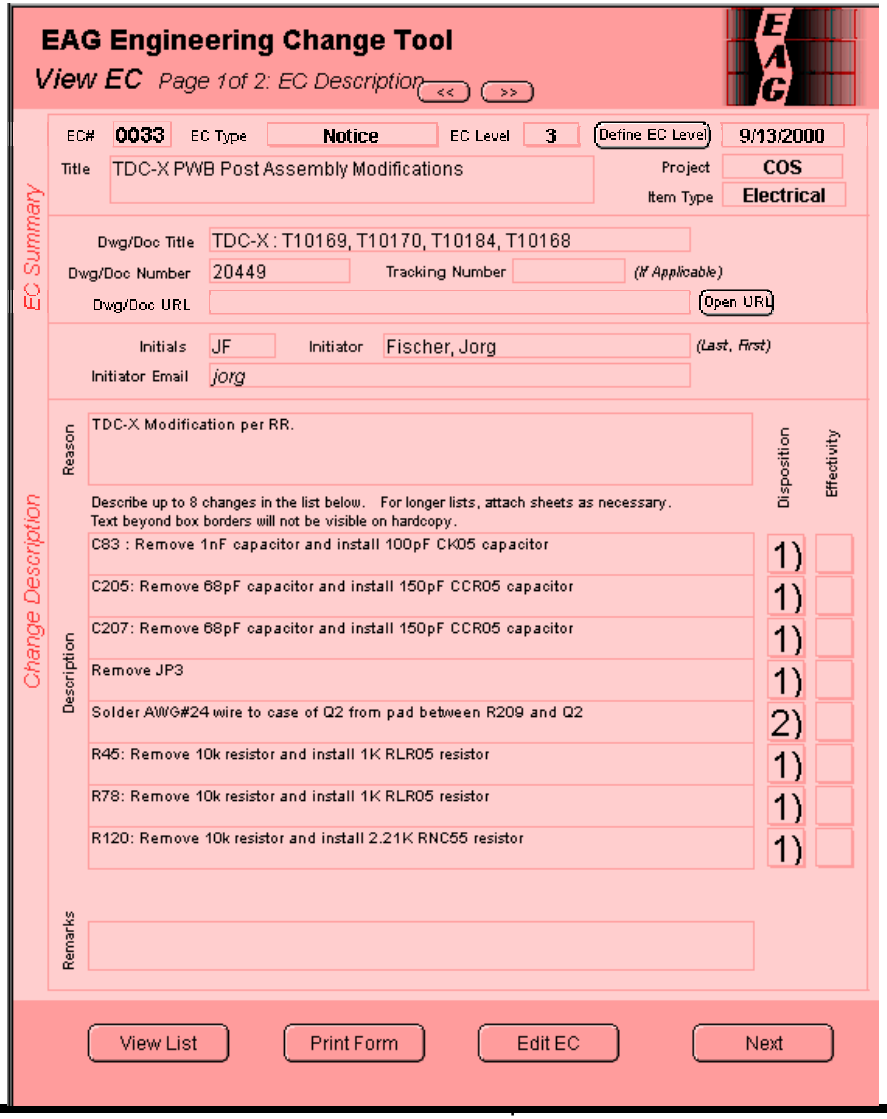
Reason: TDC-X Modification per RR.

Describe up to 8 changes in the list below. For longer lists, attach sheets as necessary.
Text beyond box borders will not be visible on hardcopy.

Description	Disposition	Effectivity
C83 : Remove 1nF capacitor and install 100pF CK05 capacitor	1)	
C205: Remove 68pF capacitor and install 150pF CCR05 capacitor	1)	
C207: Remove 68pF capacitor and install 150pF CCR05 capacitor	1)	
Remove JP3	1)	
Solder AWG#24 wire to case of Q2 from pad between R209 and Q2	2)	
R45: Remove 10k resistor and install 1K RLR05 resistor	1)	
R78: Remove 10k resistor and install 1K RLR05 resistor	1)	
R120: Remove 10k resistor and install 2.21K RNC55 resistor	1)	

Remarks

View List Print Form Edit EC Next



EAG Engineering Change Tool

View EC Page 1of 2: EC Description << >>

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R45: Remove 10k resistor and install 1K RLR05 resistor	1)	
R78: Remove 10k resistor and install 1K RLR05 resistor	1)	
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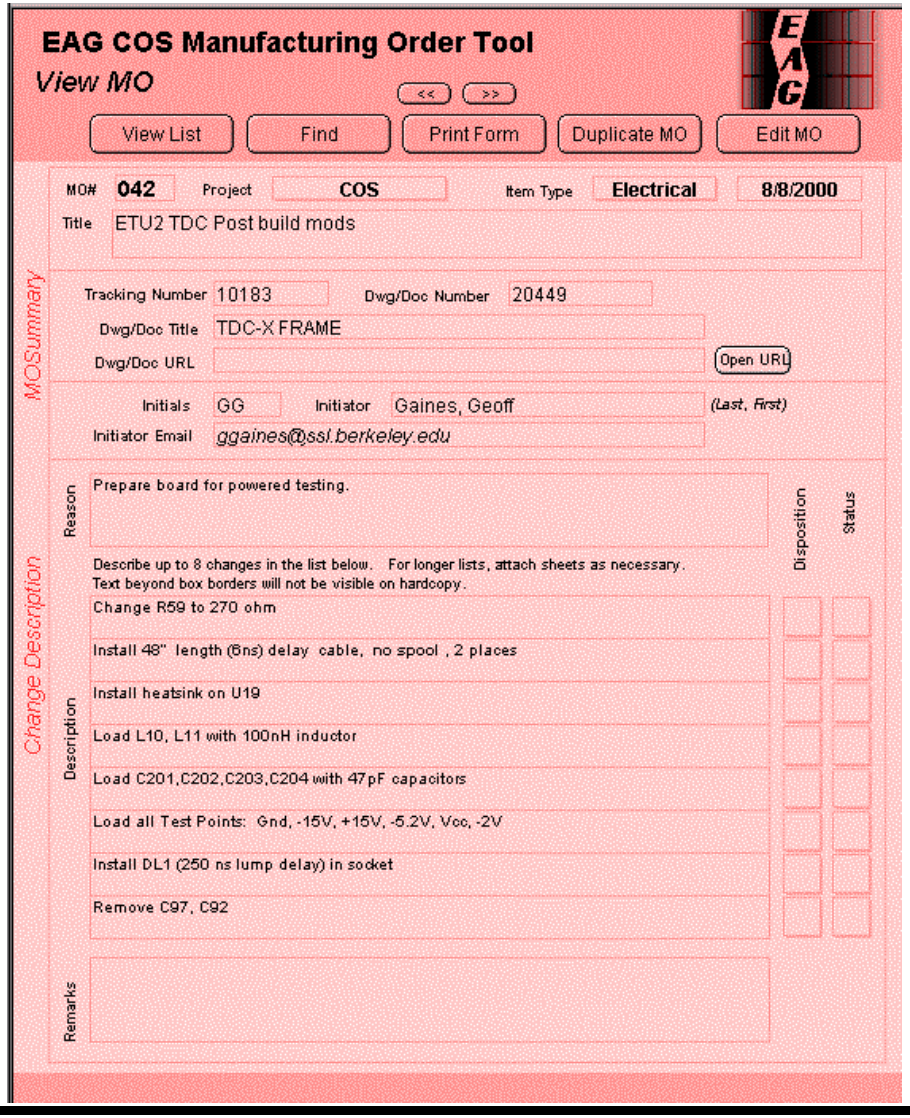
Remarks

View List Print Form Edit EC Next

Quality Assurance – Sample MO's

Center for Astrophysics and Space Astronomy



EAG COS Manufacturing Order Tool

View MO

<< >>

View List | Find | Print Form | Duplicate MO | Edit MO

MOSummary

MO# 042 Project COS Item Type Electrical 8/8/2000

Title: ETU2 TDC Post build mods

Tracking Number: 10183 Dwg/Doc Number: 20449

Dwg/Doc Title: TDC-X FRAME

Dwg/Doc URL: Open URL

Initials: GG Initiator: Gaines, Geoff (Last, First)

Initiator Email: ggaines@ssl.berkeley.edu

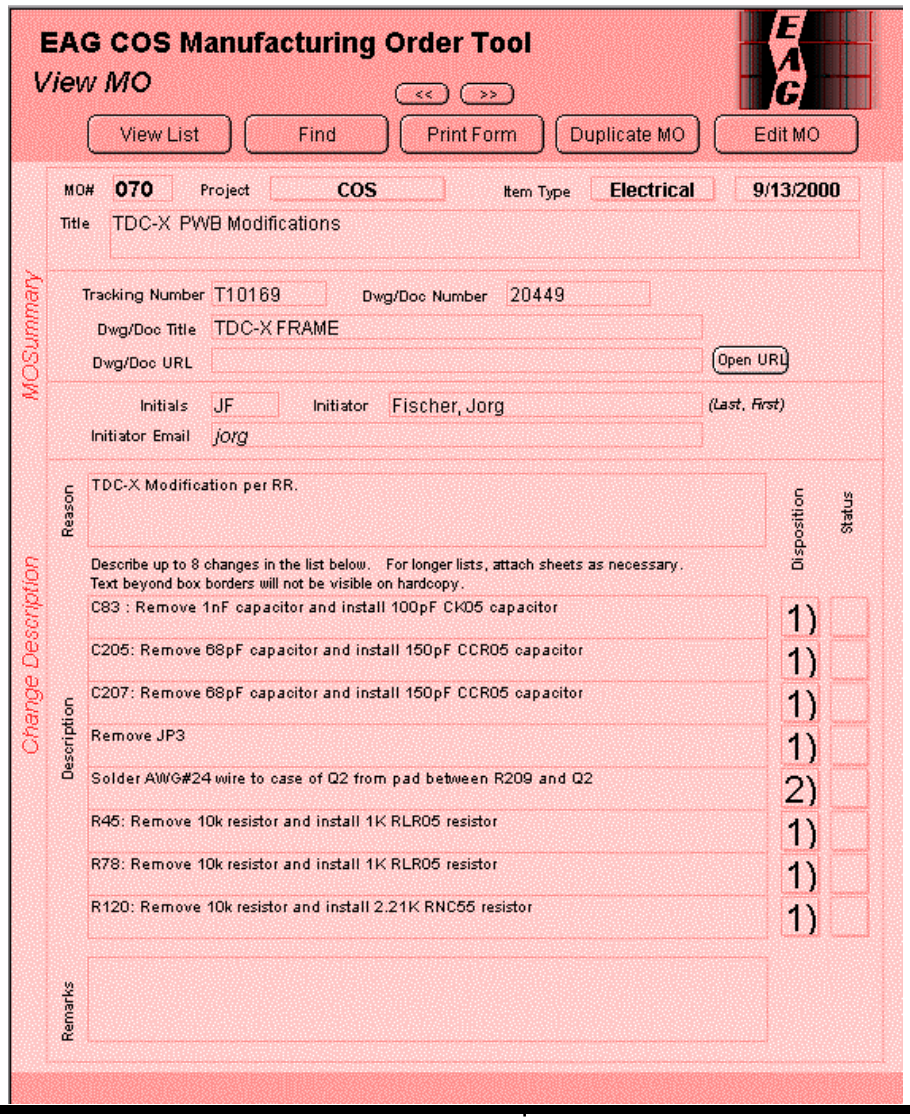
Change Description

Reason: Prepare board for powered testing.

Describe up to 8 changes in the list below. For longer lists, attach sheets as necessary.
Text beyond box borders will not be visible on hardcopy.

Description	Disposition	Status
Change R59 to 270 ohm		
Install 48" length (6ns) delay cable, no spool , 2 places		
Install heatsink on U19		
Load L10, L11 with 100nH inductor		
Load C201,C202,C203,C204 with 47pF capacitors		
Load all Test Points: Gnd, -15V, +15V, -5.2V, Vcc, -2V		
Install DL1 (250 ns lump delay) in socket		
Remove C97, C92		

Remarks:



EAG COS Manufacturing Order Tool

View MO

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View List | Find | Print Form | Duplicate MO | Edit MO

MOSummary

MO# 070 Project COS Item Type Electrical 9/13/2000

Title: TDC-X PWB Modifications

Tracking Number: T10169 Dwg/Doc Number: 20449

Dwg/Doc Title: TDC-X FRAME

Dwg/Doc URL: Open URL

Initials: JF Initiator: Fischer, Jorg (Last, First)

Initiator Email: jorg

Change Description

Reason: TDC-X Modification per RR.

Describe up to 8 changes in the list below. For longer lists, attach sheets as necessary.
Text beyond box borders will not be visible on hardcopy.

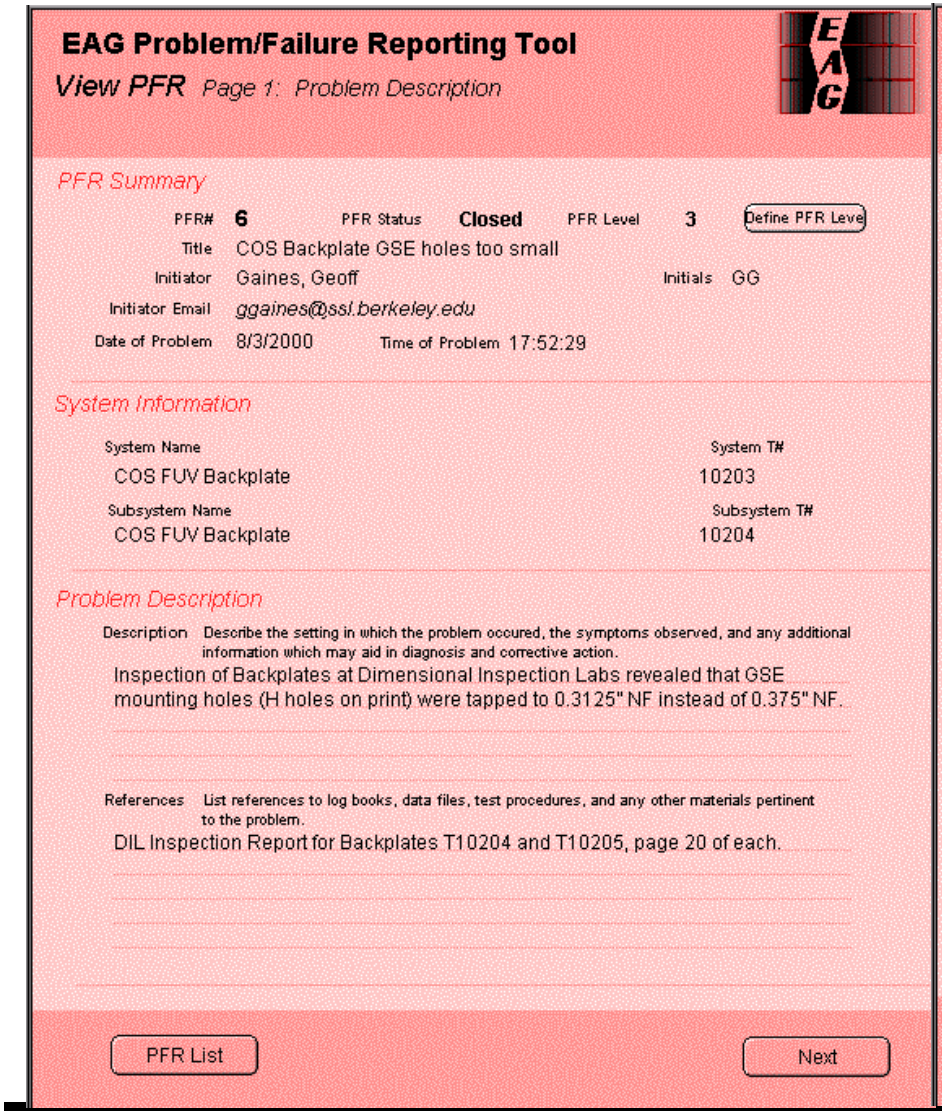
Description	Disposition	Status
C83 : Remove 1nF capacitor and install 100pF CK05 capacitor	1)	
C205: Remove 68pF capacitor and install 150pF CCR05 capacitor	1)	
C207: Remove 68pF capacitor and install 150pF CCR05 capacitor	1)	
Remove JP3	1)	
Solder AWG#24 wire to case of Q2 from pad between R209 and Q2	2)	
R45: Remove 10k resistor and install 1K RLR05 resistor	1)	
R78: Remove 10k resistor and install 1K RLR05 resistor	1)	
R120: Remove 10k resistor and install 2.21K RNC55 resistor	1)	

Remarks:

- Problem Failure Reports
  - Opened – Initiated by an engineer or consultant
  - Diagnosed – Material Review Board, MRB analyses problem and determines disposition
  - Corrected – Action taken by changing software, fixing the printed wiring assembly, schematic or mechanical hardware.
  - Closed – Corrective action is reviewed and tested to assure that the problem no longer exists and is signed off by the Initiator, Systems Engineer and QA manager

	PFR	Level	Title	
•	PFR 1	3	LVPC Frame Machining too Thin	Diagnosed
•	PFR 2	2	LVPC Connector Miswired	Closed
•	PFR 3	3	DCE-C AD7821 ADC Vss Floating	Corrected
•	PFR 4	1	COS DCE-C “Protected” Control Register	Diagnosed
•	PFR 6	3	COS Backplate GSE Hole too small	Closed
•	PFR 7	3	DCE #1 CHK B Comm Channel	Closed
•	PFR 8	3	COS Backplate Helicoils non-locking	Closed

Quality Assurance – Sample PFR



EAG Problem/Failure Reporting Tool

View PFR *Page 1: Problem Description*

PFR Summary

PFR# **6** PFR Status **Closed** PFR Level **3** Define PFR Level

Title COS Backplate GSE holes too small

Initiator Gaines, Geoff Initials GG

Initiator Email *ggaines@ssl.berkeley.edu*

Date of Problem 8/3/2000 Time of Problem 17:52:29

System Information

System Name: COS FUV Backplate — System T#: 10203

Subsystem Name: COS FUV Backplate — Subsystem T#: 10204

Problem Description

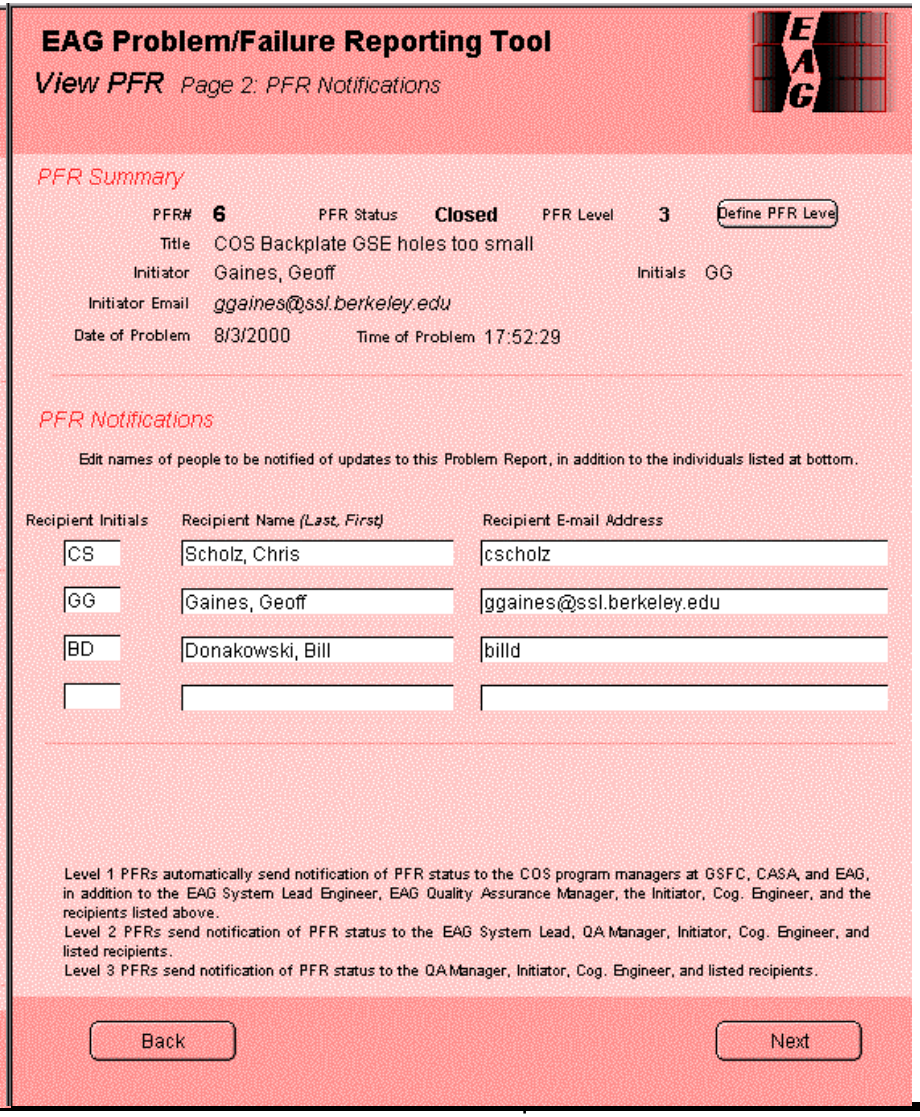
Description: Describe the setting in which the problem occured, the symptoms observed, and any additional information which may aid in diagnosis and corrective action.

Inspection of Backplates at Dimensional Inspection Labs revealed that GSE mounting holes (H holes on print) were tapped to 0.3125" NF instead of 0.375" NF.

References: List references to log books, data files, test procedures, and any other materials pertinent to the problem.

DIL Inspection Report for Backplates T10204 and T10205, page 20 of each.

PFR List | Next



EAG Problem/Failure Reporting Tool

View PFR *Page 2: PFR Notifications*

PFR Summary

PFR# **6** PFR Status **Closed** PFR Level **3** Define PFR Level

Title COS Backplate GSE holes too small

Initiator Gaines, Geoff Initials GG

Initiator Email *ggaines@ssl.berkeley.edu*

Date of Problem 8/3/2000 Time of Problem 17:52:29

PFR Notifications

Edit names of people to be notified of updates to this Problem Report, in addition to the individuals listed at bottom.

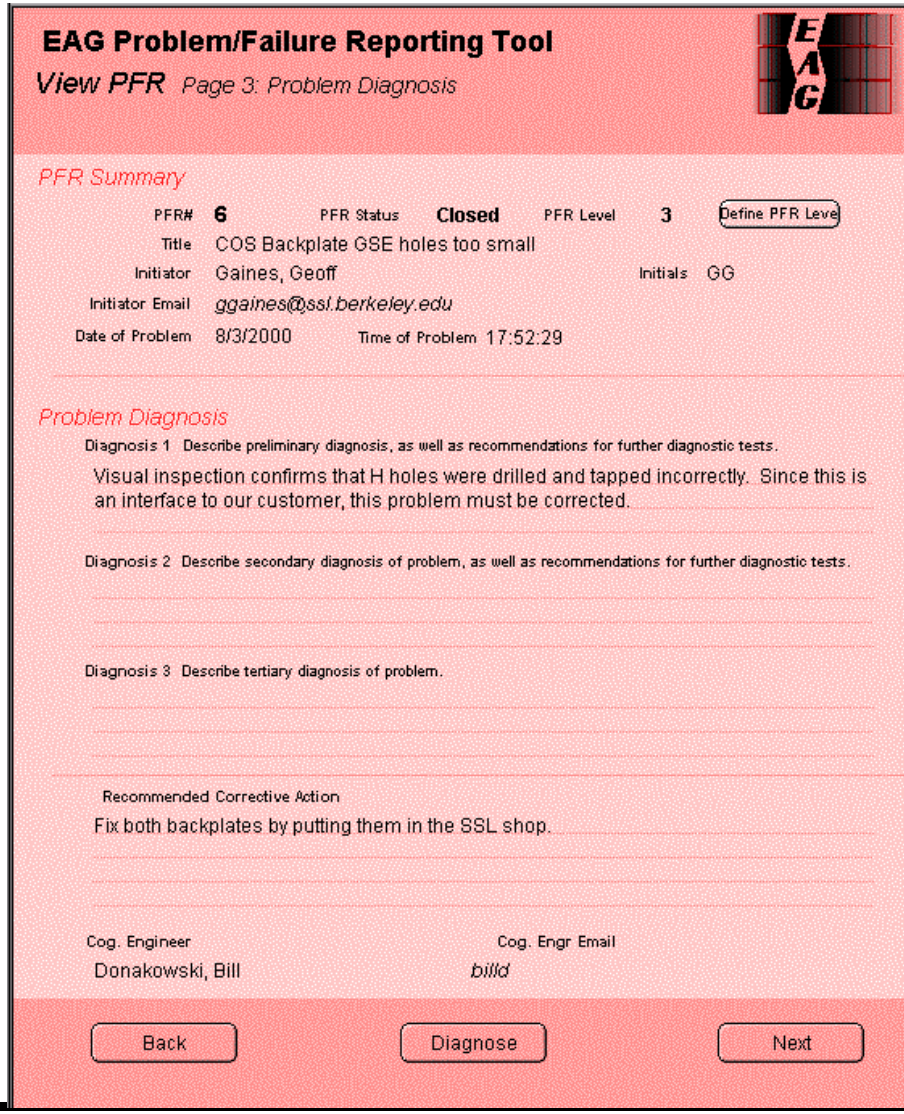
Recipient Initials	Recipient Name *(Last, First)*	Recipient E-mail Address
CS	Scholz, Chris	cscholz
GG	Gaines, Geoff	ggaines@ssl.berkeley.edu
BD	Donakowski, Bill	billd

Level 1 PFRs automatically send notification of PFR status to the COS program managers at GSFC, CASA, and EAG, in addition to the EAG System Lead Engineer, EAG Quality Assurance Manager, the Initiator, Cog. Engineer, and the recipients listed above.
Level 2 PFRs send notification of PFR status to the EAG System Lead, QA Manager, Initiator, Cog. Engineer, and listed recipients.
Level 3 PFRs send notification of PFR status to the QA Manager, Initiator, Cog. Engineer, and listed recipients.

Back | Next

Quality Assurance – Sample PFR (2)

Center for Astrophysics and Space Astronomy



EAG Problem/Failure Reporting Tool

View PFR *Page 3: Problem Diagnosis*

PFR Summary

PFR# **6** PFR Status **Closed** PFR Level **3** Define PFR Level

Title COS Backplate GSE holes too small

Initiator Gaines, Geoff Initials GG

Initiator Email *ggaines@ssl.berkeley.edu*

Date of Problem 8/3/2000 Time of Problem 17:52:29

Problem Diagnosis

Diagnosis 1 Describe preliminary diagnosis, as well as recommendations for further diagnostic tests.

Visual inspection confirms that H holes were drilled and tapped incorrectly. Since this is an interface to our customer, this problem must be corrected.

Diagnosis 2 Describe secondary diagnosis of problem, as well as recommendations for further diagnostic tests.

Diagnosis 3 Describe tertiary diagnosis of problem.

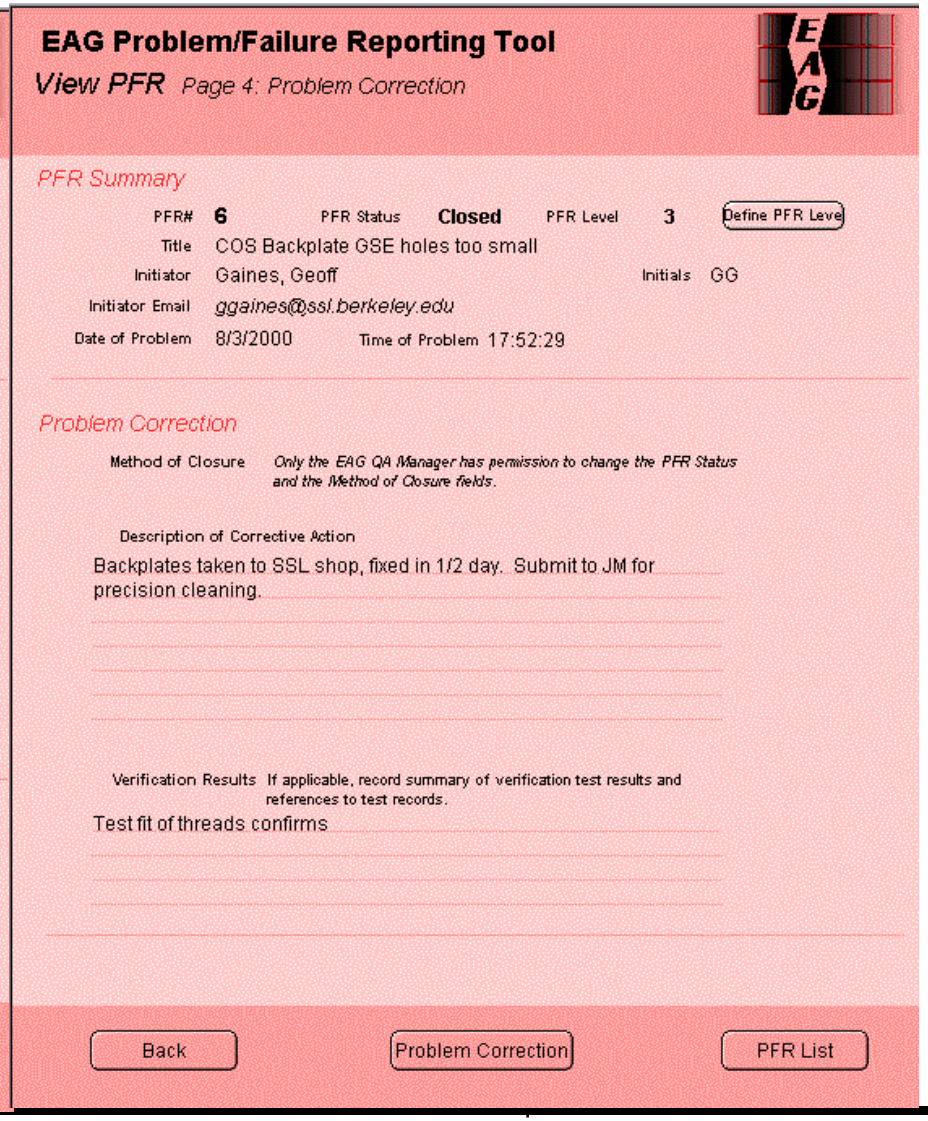
Recommended Corrective Action

Fix both backplates by putting them in the SSL shop.

Cog. Engineer Donakowski, Bill

Cog. Engr Email *billd*

Back | Diagnose | Next



EAG Problem/Failure Reporting Tool

View PFR *Page 4: Problem Correction*

PFR Summary

PFR# **6** PFR Status **Closed** PFR Level **3** Define PFR Level

Title COS Backplate GSE holes too small

Initiator Gaines, Geoff Initials GG

Initiator Email *ggaines@ssl.berkeley.edu*

Date of Problem 8/3/2000 Time of Problem 17:52:29

Problem Correction

Method of Closure *Only the EAG QA Manager has permission to change the PFR Status and the Method of Closure fields.*

Description of Corrective Action

Backplates taken to SSL shop, fixed in 1/2 day. Submit to JM for precision cleaning.

Verification Results If applicable, record summary of verification test results and references to test records.

Test fit of threads confirms

Back | Problem Correction | PFR List

- Close Outs
  - PFR's 2, 6, 7 and 8 are closed
  - PFR 1 – Nutplates have been machined but have not been installed or fit checked yet. This is a minor item since it is just used to hold the covers in place.
  - PFR 3 – Problem appears to be corrected but a final review of the issue still needs to be done.
  - PFR 4 - Problem appears to be corrected but a final review of the issue still needs to be done.

- Open Items
  - MO system will be used to track open items on each subassembly that need to be closed out, i.e. making sure all proper hardware is in place, vented and torqued, heatsinking of IC's, cleaning, staking and conformal coating
  - Possible Flourine Outgassing contamination of MDM Connectors
  - Waivers and Non-Closed PFR's
  - Worst Case, Parts Stress and Thermal Analysis of Battel Power Systems
  - Review of Parts Stress Analysis by Jerry Fridenberg on TDC's and DCE's since SAT resistors and capacitors were added to respective boards
  - Thermal Analysis of TDC's

Quality Assurance – Changes since CDR

- EEE Parts lists were supplied to GSFC
- EEE Parts were ordered by GSFC, received and stored by Unisys
- Unisys maintains all C of C's of EEE parts, including traceability
- Electrical subassemblies, Amplifiers, Power Systems, DCE's and TDC's were built by Jackson and Tull

- Waivers
  - COS Amplifiers – Currently a 10uF rated at 25 Volts resides on the 15 Volt line. This does not meet the usual 2 times derating criteria. The Amplifiers have gone through all of their thermal cycling, voltage margin testing, etc.
  - Door Motor MUA – COTS Globe Gearmotor
    - Modified by UCB
    - Flight Heritage at SSL (EUVE, CLUSTER, FUSE)
  - Solder MUA – ACME E-Solder 3022. (1.25% TML, narrowly exceeds limit)