COMPONENT FMEA & SCAR PROCESS

1.0 PURPOSE

To define the process used by Components Engineering (CE) for determination of a failed part’s ‘root cause’ of the failure. The process steps are as follows:

1) Initiation of an internal FMEA (Failure Mode and Effect Analysis) form and process
2) Notification to Purchasing to initiate SCAR, (Supplier Corrective Action Request) if required
3) Identification of manufacturer’s part number, date code, lot number, special markings, failure rate per known sample size, and symptom(s) of failure
4) Retrieval of suspect component(s) for visual and basic electrical testing
5) Testing to verify trouble symptom
6) Initiation of manufacturer’s FMEA
7) Testing for “Root Cause” of failure
8) Evaluation of the manufacturer’s Failure Analysis & Test Reports
9) Validation of SCAR
10) Advising Purchasing on course of corrective action.

2.0 SCOPE

This procedure applies only to Component FMEAs performed within the company

3.0 DEFINITIONS

4.0 RESPONSIBILITIES

5.0 REFERENCE DOCUMENTS

6.0 PREREQUISITE/S

7.0 METHOD

8.0 OUTPUT

9.0 FLOW CHART
3.0 DEFINITIONS

Bug-List: A list of Hardware or Software problems characterized by a failure to operate per specification.

Review Board: The meeting during which all ‘open’ Bug-List issues are reviewed to determine the progress and actions for resolution.

Close-Out: When a component bug failure is resolved, ‘fix’ is validated, SCAR is completed, and the bug is removed from the active bug List.

Fix: The final solution that will prevent the failure from recurring.

FMEA [Failure Mode Effects Analysis]: the analysis that is performed on a component to determine the “Root Cause” of the failure
- In-House FMEA: the analysis that is performed inside the company, usually lead and performed by the Component Engineer
- Supplier FMEA: the analysis that is performed by the component’s manufacturer

Failure Analysis: The process for investigating reasons for component failures.

Jointly Conclusive: When the Component Engineer & a manufacturer each arrive at the same conclusions.

Lot: A quantity of product [boards, systems, etc] that are manufactured, tested & inspected as a group.

Open: When a Component bug failure is not resolved.

Root Cause: The primary cause of failure.

SCAR (Supplier Corrective Action Request): a form sent by WNI to a manufacturer to initiate the FMEA processes within their organization.

Screening: A review of the Bug List to determine which failures may have a HW Component as the ‘probable’ cause.

Test Report: The information that the tester provides on the results & conclusions of all tests performed.

Validate: To determine if the ‘fix’ or solution solves the original problem.

Verify: To test the ‘fix’ derived from the FMEA.

Verification Report: The report submitted by the manufacturer that includes test reports, corrective actions, WIP remedies, and changes in manufacturing processes or procedures to ensure the problem is resolved.
### 4.0 RESPONSIBILITY

(Step #'s below match numbers of Process Flow Chart on page 4)

<table>
<thead>
<tr>
<th>Component Engineering</th>
<th>Actions</th>
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<tr>
<td></td>
<td>• Ownership of this process and:</td>
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<td>• Review Bug Flash List &amp; select ‘critical’ bugs for screening/analysis</td>
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<td>• Determine if a defective component is the “probable” cause</td>
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<td>• Complete 1st part of on-line FEMA with information provided by manufacturer and part inspection. Copy of FEMA to be forwarded to Commodity Manager.</td>
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<td>• Start in-house analysis ( calling in help from Design Engineering support, if needed)</td>
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<td>• Determine from preliminary analysis if a component failure or operating anomaly is involved</td>
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<td>• Review of manufacture’s FMEA in progress &amp; other internal Engineering test data for the purpose of accepting, rejecting, or modifying manufacturer’s recommendation.</td>
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<td>• Design &amp; execute a test to ‘verify’ the resolution of the Bug</td>
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<td>• Complete the In-House FMEA, and forward to Commodity Manager, the ‘results’ of the Verification Test with recommendations regarding the use or purge of the parts.</td>
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<td>• Review for possible acceptance or revision, the manufacturer’s FEMA, Verification Report, and SCAR.</td>
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<td>• Review the manufacturer’s FMEA Verification Report and accepts as ‘valid’ or request additional analysis or report information modification.</td>
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<td>• Approve Supplier Verification Report &amp; send a copy of the notice to Purchasing Manager</td>
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<th>Purchasing Manager or Designated Alternate</th>
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<td>• Issue manufacturer Corrective Action Request (SCAR) to Supplier &amp; put SCAR on Bug Tracking system</td>
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<td>• If informed by Components Engineer: “Not a Component problem”, notify Supplier &amp; ‘close-out’ the SCAR</td>
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<td>• Sends a copy of the completed In-House FMEA to Supplier</td>
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<td>• If requested by Components Engineer, revises as requested or furnishes additional info on verification</td>
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<td>• Closes out the SCAR and sends a copy to Supplier &amp; Purchasing w/ recommendation</td>
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<th>Supplier</th>
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<td>• Performs internal FMEA and generates SCAR response report or FMEA to be forwarded to Components Engineering.</td>
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<td>• Implements the agreed upon FMEA fix and verifies, then forwards the Verification Report to Components Engineering.</td>
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<th>Engineering Support</th>
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<td>• Design Engineer &amp; other Engineers support Components Engineering as requested to furnish data &amp; review documents to assist in the FMEA efforts.</td>
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### 5.0 REFERENCE DOCUMENTS

### 6.0 PREREQUISITE/S

- Pass Visual Inspection
7.0 METHOD

(Step #'s match numbers of Process Flow Chart on page 5)

7.1 The Components Engineer (CE) reviews the Bug List and selects the bugs for the screening process, for further analysis, based on ‘probable’ failure resulting from Component related issues.

7.2 If Components Engineering decides that a defective component is the ‘probable cause’ of a bug, proceed to step 7.3. If not, the Components Engineer continues to Monitor the Bug at weekly Meetings.

7.3 The Components Engineer fills out 1st part of FMEA form and sends a copy to the Purchasing Manager.

7.4 The Purchasing Manager completes a Supplier Corrective Action Request (SCAR) and forwards one copy to the relevant Supplier of the part along with the company’s FMEA form. The Supplier performs a FMEA, and may find the probable Root Cause & recommend the responsible ‘fix’.

7.5 The Components Engineer initiates an In-House FMEA. If needed, the responsible Design Engineer & other Engineers are consulted to assist with the analysis.

7.5.1 If the CE determines from a preliminary FMEA study that a component is not the problem, then the CE notifies Purchasing Manager to closes the SCAR & notify the Supplier to suspend their internal SCAR activity.

7.5.2 If the component is found to be at the root of the failure, the Components Engineer continues the analysis of the component via the FMEA study. When the Components Engineer receives the Supplier’s FMEA, He or she reviews the FMEA and either agrees to the Supplier’s recommendation, arriving at a consensus or continues to look for the verifiable “Root Cause” for the Failure.

7.5.3 In order to ‘verify’ the Suppliers Root Cause conclusion, The Components Engineer will design a Verification Test and may ask the Supplier to perform the identical test.

7.5.4 If the CE’s & the Supplier’s tests are ‘jointly conclusive’ in verifying the Root Cause, the analysis is considered as “complete”. If there are differences in Test Results between CE & the Supplier, a re-test to resolve may be required. If neither test verifies the Root Cause, the CE and the Supplier may perform further investigations to find the actual Root Cause. Each prepares a Test Report as part of FMEA at the end of each test.
7.5.5 When results are verified, the Component Engineer completes the In-House FMEA form (including the Test Report with recommendations to implement the changes required for the related ‘fix’). A copy is sent to the Purchasing Manager.

7.5.6 The Purchasing Manager notifies the Supplier & forwards a supplier copy of the In-House FMEA, including the recommended ‘fix’.

7.5.7 The Supplier ‘implements’ the fix & ‘verifies’ by testing to the company’s test method. If the testing verifies the fix, the Supplier also prepares a Verification Report and completes a SCAR, The two documents are forwarded to the Components Engineering department.

7.5.8 The Components Engineer reviews the Supplier’s Verification Report in conjunction with the SCAR & Supplier’s FMEA. If the Supplier’s documents receive a favorable review, proceed to 7.5.9. If the review is unfavorable, the CE sends a recommendation to the Supplier on how to clarify or revise the report and may requests additional information on any unresolved issues. The Supplier will return the Revised Report & CE will re-review and may suggest an additional investigation or close the investigation altogether.

7.5.9 If the FEMA is accepted, the Components Engineer or Design Engineer signs the Validation Report and forwards a copy to the Purchasing Manager.

7.5.10 The Purchasing Manager ‘closes-out’ the SCAR & sends a final copy to the Supplier and advises relevant Manufacturing and Operations personnel of the final status and recommended course of corrective action.

8.0 OUTPUT

- Interim and Final Test Reports
- Supplier and In-House FMEA
- Supplier Corrective Action (SCAR)
- Material Review Board (MRB) Part Disposition Action Report