NEWPORT NEWS SHIPBUILDING

NEWPORT NEWS, VIRGINIA

APPENDIX M - DoD CONTRACTS

RELIABILITY AND MAINTAINABILITY REQUIREMENTS

(June 1999)

I. GENERAL

The Shipbuilder is required to develop a reliability and maintainability design assurance program to determine whether certain critical ship systems will be capable of meeting the specified requirements.

II. VENDOR RESPONSIBILITY

To enable the Shipbuilder to comply with the above design assurance program requirements, the vendor shall cooperate with the Shipbuilder in achieving an effective design assurance program. The extent of the vendor's responsibility shall be as follows:

1. The vendor shall submit estimates of the mean-time-between-failure (MTBF) and the mean-time-to-repair (MTTR) for his equipment at the time drawings are submitted for approval. The vendor will not be required to conduct any reliability test to obtain the desired data if it is not available; however, engineering judgement shall be exercised as a means to provide the desired information based on the best available data. The data or rationale upon which the MTBFs and MTTRs are based shall be identified.
2. All vendor's designs and drawings that are submitted to the Shipyard for approval shall be accompanied with a complete description of the minimum preventive maintenance recommended by the vendor. The description shall define the tasks, special tools, parts, material and test equipment necessary to accomplish the preventive maintenance requirements; and, shall so state if a safety hazard is associated with the maintenance task. If no preventive maintenance is required, a statement to that effect is desired.
3. Collect, analyze and report all failures which occur during tests conducted by the vendor on the components, system, or subsystems prior to installation aboard ship. A failure is the inability of the system or component to meet or comply with specified performance requirements. Also, an unscheduled or continuing adjustment of the component or system to alter the output during performance testing (after grooming is completed) shall be defined as a failure for reporting purposes. Failure of a component prior to its incorporation into an assembly shall be recorded separately and reported.

   All failures and manufacturing discrepancies, affecting reliability or maintainability which are proposed for acceptance, are to be reported to the Shipyard by means of Attachment 1.

4. If requested, participate in design reviews for the purpose of: (a) reviewing current reliability achievements for each mode of operation, (b) reviewing potential design or production problem areas, (c) reviewing failure modes and effects, (d) identifying the principal items inhibiting reliability achievement and to participate in proposed solutions, and (e) reviewing the effects of engineering decisions and trade-offs upon reliability achievements.

The following definitions, excerpted from Military Standard MIL-STD-721C, Notice 1, dated 23 October 1991, are provided for convenience.

Mean-time-between-failures (MTBF). For a particular interval, the total functioning life of a population of an item divided by the total number of failures within the population during the measurement interval. This definition holds for time, cycles, miles, events, or other measures of life units.

Mean-time-to-repair (MTTR). The total corrective maintenance time divided by the total number of corrective maintenance actions during a given period of time.

Preventive Maintenance. The actions performed in an attempt to retain an item in a specified condition by providing systematic inspection, detection and prevention of incipient failure.

ATTACHMENT 1

INSTRUCTIONS FOR COMPLETING FAILURE REPORTING
AND CORRECTIVE ACTION FORM (Figure 1)

I. TO BE COMPLETED BY ORIGINATOR (Vendor for Vendor detected failures or discrepancies and cognizant Inspection Department or Engineering Technical Department for those detected at Shipyard).

1. Fill in failure report number; department number or company name and serial number.
2. Enter name of system containing failed or discrepant component.

   NOTE: THIS REPORT IS REQUIRED ONLY FOR THE SYSTEMS/EQUIPMENT LISTED BELOW:

   0. STEERING
   1. AIRPLANE ELEVATORS
   2. JET BLAST DEFLECTORS
   3. CATAPULTS
   4. AIRCRAFT STARTING AND COOLING
   5. AVIATION FUELING
   6. WEAPONS HANDLING
   7. CLASS "W" AIR CONDITIONING
   8. ELECTRONICS COOLING
   9. OXYGEN/NITROGEN

3. One copy of all reports is to be sent to the Assurance Engineering Group. Check block(s) to indicate other action addressee(s): "Vendor via Purchasing" for all Vendor-responsible deficiencies; "(Cognizant) Design Department" for those requiring design action; "Foreman (Cognizant) Operating Department" for inter- or intradepartmental Yard responsible deficiencies; "SupShip NN Code (Cognizant)" for Government Furnished Material.

   NOTE: Vendors do not complete this block. Upon receipt at the Shipyard, the cognizant Design Department will fill in as required for reports originated by Vendors.

4. Those failures requiring coordination of work between two or more departments, liaison with Vendors, possible delay in construction schedule, etc., will be sent via the Production Engineer. Those failures which may be immediately corrected by the manufacturing or installing department without assistance from other departments, unless the construction schedule would be affected, are not to be sent to the Production Engineer (e.g., failure of a standard stock item which may be immediately replaced such as overload heaters, push button contacts, stock pipe fittings, small stock valves, etc.).

   NOTE: Vendors do not complete this block. Upon receipt at the Shipyard, the cognizant Design Department will fill in as required for reports originated by Vendors.

5. Check one block to identify the test or operation being conducted when the failure or discrepancy occurred and indicate location of "Failed Equipment" (e.g., Pump Room No. 3, FR80 Starboard, etc.).
6. Description of Failed Equipment: Commence with lowest level of failed or discrepant item and work up through assembly level and enter brief description (e.g., part-spring, component -- 2" bronze relief valve, assembly -- H.P. air commpressor); indicate manufacturer, serial number, model number, etc., as available.
7. Enter drawing number, revision, and piece number for Shipyard and Vendor's drawings as applicable.
8. If purchased, enter purchase order and item number. If manufactured in Yard, enter group sheet and line number; if government furnished, enter item number from PD "Government Furnished Material List."
9. Include a complete description of the failure. If more space is required, add an extra sheet, check "See attachment_____" and fill in a number (1, 2, 3, etc.) for the attachment. If other information is attached (e.g., Test Form, Form 155, etc.) also fill in identification number.
10. Enter the apparent cause of failure and malfunction symptoms if known.
11. Enter description of operating conditions (e.g., environment, test/operating objectives, pertinent data, etc.) in chronological order. If more space is required, add an extra sheet, check "see attachment_____" and fill in an attachment number which follows in sequence. If other pertinent data is attached (e.g., Test Form, Form 155, etc.), also fill in identification number.
12. If known, enter the operating time (hours or cycles) since last failure and the total operating time for the failed equipment.
13. Print and sign your name, enter Department or company, date the failure or discrepancy and date of report.

INSTRUCTIONS FOR COMPLETING FAILURE REPORTING
AND CORRECTIVE ACTION FORM (Figure 1) (Continued)

II. TO BE COMPLETED BY PRODUCTION ENGINEERING DEPARTMENT

NOTE: Vendors do not complete this section.

14. Check one block to indicate disposition recommended to the action activity. If more space is required, add an extra sheet, check "see attachment_____" and fill in sequential attachment number.
15. If appropriate, check block and indicate date that material is needed.
16. If Vendor representation is needed, check block, indicate date Vendor should be in Yard.
17. If correction is at Vendor's expense or if otherwise desired, check "Job Order" block and fill in assigned job order number, authorization signature, and date.

    THE FOLLOWING TO BE FOLLOWED THROUGH BY PD:

18. If correction is at Vendor's expense and cost estimate is necessary, check block. Enter name of cost estimator making estimate and date of estimate.

III. TO BE FILLED IN BY ACTION ACTIVITY

19. If purchased, indicate whether Vendor was contacted and if so fill in name of person contacted and date. Vendor will indicate Shipyard representative contacted if applicable.
20. If special approval is necessary, check block and fill in data special approval was requested, letter identification, etc.
21. If Shipyard or Vendor's drawing(s) will be revised because of action to be taken, check block and fill in drawing number(s) and revision(s) which will incorporate correction action.
22. If supplementary instructions are necessary, identify in this block (e.g., sketch, procedure, Form 155, etc.).
23. Give complete description of corrective action. If more space is required, add an extra sheet, check "see attachment_____" and fill in sequential attachment number.
24. Comment as to cause and effect, conclusions and recommendations related to current design and future design if different from current corrective action. e.g. Prevention of failure recurrence, improvements in reliability, maintainability, safety, manufacturing controls, etc.
25. Enter name (printed) and signature of person(s) completing blocks 19 through 26; enter department or company and date.
26. Indicate distribution of report; include all persons who have been actively involved, originator, and persons responsible for initiating and taking corrective action.

NOTE: Vendors do not complete this block. Upon receipt at Shipyard, cognizant Design Department will fill in as required for reports originated by Vendors.

IV. TO BE COMPLETED BY ORIGINATOR

27. Indicate if work has been satisfactorily accomplished, satisfactory performance of equipment has been demonstrated, or if satisfactory inspection of equipment has been accomplished. If additional comments and/or data are required, attach check "see attachment_____" block, and fill in sequential attachment number (e.g., Test Form performance data, etc.).
28. Enter signature, department or company and date corrective action is cleared.

    NOTE: Upon clearance of failure, send a signed copy of the report to the Assurance Engineering Group.

FIGURE 1
FAILURE REPORTING AND CORRECTIVE ACTION FORM
This form will also be used to report accepted discrepancies,

requiring special approval or change in design, to AEG

ORIGINATOR

1. Failure Report Number

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Hull

- FOR CRITICAL SYSTEM ONLY - See instructions for completing form for list.

System:_____

- REPORT FOR: o AEG

o Vendor via Purchasing o _____Design Dept.

o Foreman_____ Dept. o SupShip NN Code:_____

- Via : o Production Engineer

- During indicated test

Component(s) failed as described below:

o Ship Test

o Other (identify)

Present Location of Equipment

DESCRIPTIONOF FAILED OR DISCREPANT EQUIPMENT:

6.		Name	Mfg.	
	Part			
	Component			
	Assy/Subassy			
7.		Dwg. #	Rev.	
	Part			
	Component			
	Assy/Subassy			

DESCRIPTION OF FAILURE DISCREPANCY:

9. Description:

_____

See Attachment_____

10. Apparent Cause and Malfunction Symptoms: _____

11. Test / Operating Conditions Pre-Failure:

_____

Conditions at Failure:

_____

Conditions Post Failure:

_____

o See Attachment_____

12. Operating Time Since Last Failure:_____

NAME AND SIGNATURE OF ORIGINATOR:

13. Name: Signature: Dept. or Company

FIGURE 1 (continued)

RECOMMENED DISPOSITION:

14. o Replace o Alter o Use as is o Alter mating piece

Correction by o Vendor o NN o See Attachment_____

15. o Material Required by _____date

PRODUCTION				
	17. o Job Order No. _____Issued to cover correction Authorized by _____PD_____ date			
	18. o Cost Est. Reqd. Est. by _____ CE _____ date			
ACTION ACTIVITY	CORRECTIVE ACTION:			
	19. Vendor Contacted o Yes o No NN Repr. Contacted o Yes o No			
	20. o Special Approval Requested			
	21. o Drawings will be received			
		Dwg. No.	Rev.	Dwg
	22. o See Also_____			
	23 Description of Corrective Action: _____ See Attachment: _____			
	24. Comments: (Conclusions, Recommendations--current and future design) _____ See Attachment: _____			
	25. Name Signature Dept. or Company Date _____			
	26. Distribution	PA		
	Total Copies			
ORIGINATOR	27. o Failure has been corrected as noted above and subject equipment has been re-tested/operated/inspected and found to be satisfactory. o See Attachment _____			
	28.	Signature		