**Westinghouse
Astronuclear
Laboratory**

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**WANL-TME-2766
JANUARY 1971**

**DATA ITEM R-201
MAINTAINABILITY
ALLOCATIONS ASSESSMENT
AND ANALYSIS REPORT
NUCLEAR SUBSYSTEM**

MASTER

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Westinghouse Astronuclear Laboratory

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ABSTRACT

This document presents the Maintainability features of the Nuclear Subsystem of the NERVA engine. It provides an evaluation of the current and potential maintainability of the NSS for meeting the specified requirements.

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TABLE OF CONTENTS

<u>Section</u>		<u>Page</u>
1.0	INTRODUCTION	1-1
	1.1 PURPOSE	1-1
	1.2 APPLICABLE DOCUMENTS	1-1
2.0	NUCLEAR SUBSYSTEM	2-1
	2.1 SYSTEM DESCRIPTION	2-1
	2.2 MAINTAINABILITY DESIGN REQUIREMENTS	2-1
	2.3 ANALYSIS	2-3
	2.3.1 Analysis of FMECA Results	2-3
	2.3.2 Block 8 Maintenance Analysis	2-3
	2.3.3 Repair/Replacement Analysis	2-3
	2.4 ASSESSMENT	2-3
3.0	FUEL ELEMENTS	3-1
4.0	CLUSTER HARDWARE	4-1
5.0	CORE PERIPHERY	5-1
6.0	SUPPORT PLATE & PLENA	6-1
7.0	INTERNAL SHIELD	7-1
8.0	REFLECTOR ASSEMBLY	8-1
9.0	CONTROL DRUM DRIVE ASSEMBLY	9-1
	9.1 SYSTEM DESCRIPTION	9-1

TABLE OF CONTENTS (Cont'd)

<u>Section</u>	<u>Page</u>
9.2 REQUIREMENTS	9-2
9.3 ANALYSIS	9-2
9.3.1 Analysis of FMECA Results	9-2
9.3.2 Block 8 Maintenance Analysis	9-4
9.3.3 Repair/Replacement Analysis	9-4
9.4 ASSESSMENT	9-10
10.0 STRUCTURAL SUPPORT COOLANT ASSEMBLY	10-1
10.1 SYSTEM DESCRIPTION	10-1
10.2 REQUIREMENTS	10-1
10.3 ANALYSIS	10-2
10.3.1 Analysis of FMECA Results	10-2
10.3.2 Block 8 Maintenance Analysis	10-3
10.3.3 Repair/Replacement Analysis	10-4
10.4 ASSESSMENT	10-4
11.0 NUCLEAR SUBSYSTEM INSTRUMENTATION	11-1
11.1 SYSTEM DESCRIPTION	11-1
11.2 REQUIREMENTS	11-1
11.3 ANALYSIS	11-1
APPENDIX A	A-1
APPENDIX B	B-1

LIST OF FIGURES

<u>Figure No.</u>	<u>Title</u>	<u>Page</u>
9-1	Schematic Arrangement of Typical CDDA Unit	9-7
9-2	Normal Operational Mode	9-8
10-1	Structural Support Coolant Valve Actuator	10-5

LIST OF TABLES

<u>Table No.</u>	<u>Title</u>	<u>Page</u>
9-1	Bolted Design	9-6
A-1	Control Drum Actuator - Preoperational	A-2
A-2	Control Drum Actuator - Post Operational	A-5
A-3	SSCV Actuator	A-8

1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this document is to present the maintainability features of the Nuclear Subsystem of the NERVA Engine. It reviews the capability of maintainability of each of the critical components of the NSS to meet the requirements of the NPRD, the NERVA Engine Specification, the NSS Specification and related Critical Component Specifications.

This data item documents the NSS Maintainability evaluation and is applicable to all phases of the NERVA Engine Program. It provides an evaluation of the current and potential maintainability of the NSS and provides information to assist in planning equipment and facility requirements for the program.

1.2 APPLICABLE DOCUMENTS

Government Documents

MIL STD 470 - Maintainability Program Requirements

MIL STD 471 - Maintainability Demonstration

MIL HDBK 472 - Maintainability Prediction

MIL STD 72113 - Definition of Effectiveness Terms for Reliability, Maintainability,
Human Factors and Safety.

Program Documents

SNPO-NPRD-1 NERVA Program Requirements Document

CP-90290 - Engine NERVA, 75K, Full Flow

CP-677555A - NERVA Nuclear Subsystem

CP-677576 - Structural Support Coolant Valve Actuator

CP-677585 - Control Drum Drive Assembly

CP-677565 - NSS Instrumentation

R-102 - Maintainability Program Plan

R-202 - Reliability Allocations, Assessments and Analysis Report

2.0 NUCLEAR SUBSYSTEM

2.1 SYSTEM DESCRIPTION

The Nuclear Subsystem consists of a hydrogen cooled, graphite moderated, intermediate neutron energy reactor, and its associated reactivity control devices consisting of neutron absorbing control drums with their actuation system and the Structural Support Coolant Assembly.

The engineering critical components of the subsystem include the Fuel Elements, Cluster Hardware, Core Periphery, Support Plate and Plena, Internal Shield, Reflector Assembly, Control Drum Drive Assembly structural Support Coolant Valve, The Structural Support Coolant Valve Actuator, the NSS Instrumentation and the Neutron Source.

2.2 MAINTAINABILITY DESIGN REQUIREMENTS

The maintainability requirements for the NSS are specified in the detailed specification for the NSS, CP-67755A and are consistent with the maintainability requirements of the NPRD and the NERVA Engine Specification, CP-90290. The primary NSS maintainability requirements are given below:

- a. There shall be no routine NSS maintenance. Routine inspection shall be permitted.
- b. Preventive maintenance shall be limited to purging as required.
- c. Corrective maintenance shall be performed when checkout or trend data indicate that maintenance is required. Corrective maintenance shall be limited to removal and replacement of the Structural Support Module as defined in CP-90290, individual CDDA actuators, and NSS instrumentation external to the Pressure Vessel.
- d. The NSS components external to the pressure vessel shall be designed to permit manual maintenance during ground operations. Manual maintenance shall not be required where radiation dose levels exceed those established by radiation dose guides.

- e. The structural support module, individual CDDA actuators and the NSS instrumentation external to the pressure vessel shall be designed to permit remote maintenance in hostile environments.
- f. NSS components internal to the pressure vessel shall require no maintenance throughout the useful life of the NSS. NSS components external to the pressure vessel shall be capable of being maintained by removal, adjustment, or substitution, and replacement. Planned maintenance shall be limited to ground and earth orbit operations.
- g. The Structural Support Module as defined in CP-90290 shall be maintained remotely by replacement or substitution (switching or redundancy) when in a hostile environment, and shall be capable of manual replacement in a non-hostile environment.
- h. The SSCVA shall be capable of maintainability as required by the structural support module as defined in CP-90290.
- i. The CDDA actuators, a part of the CDDA, shall be maintained remotely by replacement or substitution (switching or redundancy) when in a hostile environment, and shall be capable of manual replacement when maintained in a non-hostile environment. The Actuator Malfunction Override Device (AMOD), a part of the CDDA, shall be capable of being manually or remotely reset.
- j. NSS instrumentation external to the pressure vessel shall be capable of manual replacement in a non-hostile environment.
- k. The design of NSS components for maintainability shall not compromise performance or reliability, and the effect on weight shall be minimized.
- l. All components shall be capable of remotely conducted functional and electrical checkout subsequent to assembly or maintenance as defined in the component design documentation. The functional and electrical checkout requirements shall be compatible with the flight checkout system.
- m. The design for maintainability of NSS components shall be as simple as it is feasible. Where maintenance design results in undue complexity, the complexity shall be incorporated in the maintenance equipment rather than the NSS component.

- n. The maintenance design of the NSS components shall be in accordance with the human performance requirements of CP-677555.

2.3 ANALYSIS

2.3.1 Analysis of FMECA Results

Failure of the NSS Module is a function of the failure of its critical components and FMECA results for the NSS critical components are presented in Data Item R-202. Analysis of the failures of the NSS critical components applicable to maintainability are discussed in later sections of this data item.

2.3.2 Block 8 Maintenance Analysis

The block 8 maintenance analysis for the NSS module identified the maintenance functions required to replace the module in the event of failure during engine assembly and checkout or during S-N assembly and checkout. Replacement after operation or in space is not required. An end item maintenance sheet and associated requirement allocation sheets for NSS module replacement have been prepared and are included in the Appendix B.

2.3.3 Repair/Replacement Analysis

Although the block 8 maintenance analysis considered the replacement of the NSS module, a detailed repair/replacement analysis has not been performed since the maturity of the engine design, engine assembly functions, and S-N assembly functions are not sufficient to perform the analysis. The RASs in the appendix do, however, present the general steps required to replace the NSS module.

2.4 ASSESSMENT

There are no requirements for maintenance of the NSS assembly as a unit. Required maintainability of specific NSS critical components is discussed later in this report.

Although a block 8 maintenance analysis was performed and requirement allocation sheets were prepared for the replacement of an NSS module, detailed repair/replacement analysis was not conducted.

3.0 FUEL ELEMENTS

There are no maintainability requirements for this component.

4.0 CLUSTER HARDWARE

There are no maintainability requirements for this component.

5.0 CORE PERIPHERY

There are no maintainability requirements for this component.

6.0 SUPPORT PLATE & PLENA

There are no maintainability requirements for this component.

7.0 INTERNAL SHIELD

There are no maintainability requirements for this component.

8.0 REFLECTOR ASSEMBLY

There are no maintainability requirements for this component.

9.0 CONTROL DRUM DRIVE ASSEMBLY

9.1 SYSTEM DESCRIPTION

The Control Drum Drive Assembly (CDDA) consists of eighteen (18) individual control drum drive units. Each control drum drive unit has an actuator mechanism, actuator controller, and an actuator malfunction override device (AMOD). Figure 9-1 shows the schematic arrangement of a control drum drive unit (CDDU) with respect to other engine and NSS components.

Actuator Mechanism

The actuator mechanism is an electrical stepper motor which converts electrical signals received from the controller into rotary movement of the control drum.

Figure 9-2 shows the normal operational mode of a Control Drum Actuator (CDA) with the AMOD in a safe or cocked position. The CDA weighs approximately 10 lbs. and has a cylindrical shape with envelope dimensions of approximately 7.4 inches in length and 5.5 inches diameter. Each CDA actuator is hydrogen cooled to withstand nuclear radiation.

Actuator Controller

The actuator controller located remotely from the actuator receives demand signals from the control system and sends conditioned signals to an electrical stepping motor in the actuator.

Actuator Malfunction Override Device

The actuator malfunction override device (AMOD) transmits the torque from the electric actuator to the control drum in the normal operating mode when the AMOD is in a cocked position as shown in Figure 9-2. In the event of an actuator malfunction, the AMOD returns the control drum to the "orifice angle position" upon command signal from the control system.

9.2 REQUIREMENTS

The maintainability requirements for the control drum drive assembly are specified in the detailed specification for the CDDA, EC-677585, and the detailed specification for

the NSS, CP-677555A. These requirements are consistent with the maintainability requirements of the NPRD and the NERVA Engine Specification, CP-90290. The primary CDDA maintainability requirements are given below:

1. The CDDA actuators as part of the CDDA, shall be designed to be maintained remotely by replacement when in a hostile environment and shall be capable of manual replacement when maintained in a non-hostile environment.
2. Each AMOD shall be designed with the capability of being reset from the actuator override configuration to the normal configuration. Reset of an AMOD shall be accomplished with its actuator removed.
3. The CDDA actuators shall be capable of remotely conducted functional and electrical checkout subsequent to corrective maintenance. The functional and electrical checkout requirements shall be compatible with the flight checkout system.

9.3 ANALYSIS

9.3.1 Analysis of FMECA Results

In the FMECA results, the failure modes for the CDDA were examined in terms of failure modes for individual control drum drive units. The following failure modes were considered in this report.

9.3.1.1 Failure Modes

a. Fail In Place

A CDDU fails in the position that it is in at the time of failure and cannot move its control drum in either direction upon demand.

b. Fail and Move to the Full Out Position

A CDDU fails and positions the control drum in a full out position.

c. Fail and Move to the Full In Position

A CDDU fails and positions the control drum in a full in position.

d. Fail and Produce an Oscillating Output Motion

A CDDU produces an oscillatory rotary motion on the control drum which is not in accordance with the input demand signal from the controls system.

e. Fail to Move at Desired Velocity

A CDDU is moving its control drum either too fast or too slow in response with its input demand signal. The affected control drum is not in synchronization with the other control drums.

f. Premature Operation of the AMOD

The AMOD is accidentally fired and fixes the control drum in the CDDU at the orifice angle.

g. Actuator Mechanism Separates from its Mounting Surfaces

The actuator mechanism separates from its mounting surfaces causing an undesirable leakage in propellant.

9.3.1.2 Corrective Action

For failure modes a, b, c, d, and e, the corrective action to restore the defective CDDU to a safe operational state is to activate the AMOD on the affected actuator to return its associated control drum to the orifice angle position. There is a limit on the number of AMODs which may be fired for safe operation of the NSS. Eventual removal of the actuator is required to reset the AMOD.

No corrective action is required for the failure f. since the control drum has been placed in the orifice angle position by the inadvertent firing of its AMOD.

Failure mode g. requires an actual replacement of the defective actuator to restore the NSS to a satisfactory operating mode.

9.3.2 Block 8 Maintenance Analysis

The Block 8 maintenance analysis identified the maintenance functions to be performed in the event of a control drum actuator malfunction for ground assembly and check-out functions. Block 8 maintenance analysis has not been performed for flight functions or for post operational ground test replacement.

Based on the block 8 maintenance analysis, requirements allocation sheets were prepared to identify equipment and facility requirements for actuator replacement. The equipment and facility requirements for actuator replacement of a "cold" engine are consistent with those required for engine assembly.

The maintenance functions and associated RASs are presented in the Appendix B.

9.3.3 Repair/Replacement Analysis

The elements of a corrective maintenance cycle for replacement of a control drum actuator were analyzed for two cases:

1. Ground - Preoperational
2. Ground - Post operations

Each maintenance action was considered and estimates of manpower, repair times and equipment required were made to determine a preliminary evaluation of the maintenance function. These analyses are presented in Appendix A.

The results of the analyses indicate that prior to reactor operation, the ground replacement of a control drum actuator does not require special tools.

However, after the reactor has been operated, special care must be taken to protect the maintenance personnel from radiation. Remote handling equipment must be employed with special tools to perform maintenance on the control drum during "hot" radiation conditions.

In the case of post-reactor operations, the repair times are much longer since the maintenance personnel must consume extra time in utilizing remotely operated tools to perform tasks because of radiation hazards. A detailed study of required shielding for maintenance has not been performed. Data on radiation dose levels for time at full power versus time after shutdown are tabulated for various locations external to the pressure vessel in Data Item S-100. The time required to replace an actuator in the maintainability analysis assumes adequate shielding is available when replacement is required. The requirements for the shielding design will have to be made on the basis of delay time versus cost, weight, and complexity of shielding for final resolution of engine "down" time to replace an actuator. A summary of the two cases analyzed is given in Table 9-1.

Repair/replacement analyses were not performed for flight operations since there is little or no basis to predict time to repair for extra-vehicular activity. However, it is felt that some form of separate, shielded, self propelled space vehicle will be required to transport the astronauts around the NERVA engine for maintenance activities. The repair times for space activities will be much larger than ground activities as a result of EVA limitations.

Repair/replacement analysis of the actuator controller has not been performed since the location and mounting arrangement has not been defined. However, the maintainability requirements may also apply to the actuator controller and the eventual design and mounting arrangement should consider these requirements.

9.4 ASSESSMENT

The present CDDA design appears to meet the maintainability requirements of the NERVA Engine Specification CP-90290, the NSS Specification CP-677555, and the Control Drum Drive Assembly Specification EC-677585. Although the physical design of the actuator controller has not been completed and has not been included in the analysis, it is considered that the controller can be designed to meet the maintainability requirements.

From the analysis of FMECA results actuation of the AMOD provides temporary corrective action for most CDDA failures. Permanent corrective action requires replacement of the defective actuator or controller. For those CDDA failures wherein the AMOD is not fired or not capable of being fired, actuator and/or controller replacement is required as soon as practicable.

As stated in Section 9.3.3, two cases of maintenance for the CDA were analyzed. The results of these analyses are summarized below:

1. For ground preoperational replacement, special tools and equipment are not required and the estimated total time to replace an actuator is 69 minutes. This time should be considered a minimum since the analysis assumed no problems developed during removal, replacement or checkout.
2. For ground post-operational replacement, special remote handling tools and shielding will be required. The estimated time to replace an actuator is 315 minutes.

TABLE 9-1
BOLTED DESIGN

	Ground	
	<u>Pre Operational</u>	<u>Post Operational</u>
Estimated Time to Replace-Minutes (AMOD Fired)	69	315
Skills*	Reactor Assembly Technicians	Reactor Assembly Tech. Radiation Monitor Crane Operator
Tools	<ul style="list-style-type: none"> a. Ratchet type wrench b. hand mirror c. mallet d. torque wrench 	<ul style="list-style-type: none"> a. Ratchet type wrench b. Periscope system c. Special tool to secure lock fastener d. Remote manipulator e. Temp. shield f. Tools to rig temp. shield g. Torque wrench

*Does not include post installation checkout personnel.

Figure 9-1. Schematic Arrangement of a Typical CDDA Unit With Respect to Other Engine System Equipment

Figure 9-2
Normal Operational Mode

10.0 STRUCTURAL SUPPORT COOLANT ASSEMBLY

10.1 SYSTEM DESCRIPTION

The SSCA consists of a valve module containing two actively redundant flow channels each consisting of an SSCV and SSBV with associated actuators, and interconnecting piping (SSCL) between the valve module and other engine components.

10.2 REQUIREMENTS

The maintainability requirements for the SSCA are specified in the detailed specification for the SSCA EC-677575 and the detailed specification for the NSS CP-677555. These requirements are consistent with the maintainability requirements of the NPRD and the NERVA Engine Specification CP-90290. The primary maintainability requirements are given below:

1. The structural support coolant module shall be maintained remotely by replacement when in a hostile environment and shall be capable of manual replacement in a non-hostile environment.
2. The SSCV actuators shall be designed to be removed and replaced manually when maintained in a non-hostile environment.
3. The SSCV actuators shall be capable of remotely conducted functional and electrical checkout subsequent to corrective maintenance. The functional and electrical checkout requirements shall be compatible with the flight checkout system.

10.3 ANALYSIS

10.3.1 Analysis of FMECA Results

Failure modes were defined for the SSCA system; the system effects of each failure mode were specified, and the system capability to compensate for these effects was analyzed.

10.3.1.1 SSCV &/or Actuator Failure Modes

(a) Fail Closed

The SSCV fails and moves to a full closed position with no capability of opening the SSCV upon command.

(b) Fail Open

The SSCV fails and moves to a full open position with no capability of moving the SSCV upon command.

(c) Fail to Intermediate Position

The SSCV fails in an intermediate position between full open and full closed position with no capability of moving the SSCV upon command.

(d) Excessive Internal Leakage

The leakage of propellant through the SSCV at a rate greater than the specification extreme leak rate when the valve is in a full closed position.

(e) Random Operation

The valve position of the SSCV is not in accordance with its input demand signal from the controls system.

(f) Degraded Operation

The dynamics of SSCV control performance is outside the limits set by normal performance requirements.

10.3.1.2 SSBV &/or Actuator Failure Modes

The failure modes for the structural support block valves are identical to those described in Sections 10.3.1.1, a through e for the structural support coolant valve.

10.3.1.3 Corrective Action

In the previously described failure modes for the SSCV and the SSBV, the immediate corrective action is to effectively block the flow of propellant through the branch containing the defective valve and constrain SSCA operations to the use of its non-faulted branch. The

SSCA contains two branch lines, each having a SSCV and a SSBV, to provide redundancy in system operation which is combined reliability, safety and maintenance feature. Final corrective action requires replacement of the SSCA module.

10.3.2 Block 8 Maintenance Action

The Block 8 Maintenance Analysis was not performed on the Structural Support Coolant Assembly since it is part of the Structural Support Coolant System module which is maintainable as a module.

A Block 8 maintenance analysis was performed for ground assembly and checkout functions on the Structural Support Coolant Valve Actuators (SSCVA) since it is feasible to replace the SSCVA during ground operations. The present SSCVA design permits the manual removal of an actuator from the SSCV in a non-hostile environment.

Based on the Block 8 maintenance analysis, requirements allocation sheets were prepared to identify equipment and facility requirements for an SSCV actuator. The RASs are presented in the Appendix B and indicate equipment and facility requirements are the same as those required for manual replacement of a CDA.

10.3.3 Repair/Replacement Analysis

The maintenance steps for ground replacement of an SSCV actuator on the SSCA prior to reactor operation were analyzed.

The current SSCVA design was examined in this analysis. The design concept for the SSCVA utilizes a three-bolt joint to secure the actuator to the SSCV and locking devices to secure the three fastener bolts in place.

Each maintenance task in the removal and replacement of an SSCVA was investigated, and support maintenance requirements were evolved directly from the task descriptions in the analysis. The analysis results are presented in the Appendix A and indicate an estimated time to replace an SSCVA is 64 minutes.

The results of the analysis indicated that prior to reactor operation, the replacement on the ground of an SSCV actuator does not require special skills or tools.

10.4 ASSESSMENT

The SSCA design appears to meet the maintainability design requirements as defined in the NERVA Engine CP-90290 Specifications, the NSS C-002 Specifications, and ECC Specifications for the Structural Support Coolant Assembly. The present SSCVA design appears to meet the applicable maintainability design requirements enumerated in Section 10.2 of this report.

The failure modes for the SSCA system were analyzed in terms of single component failures of individual structural support coolant valves and actuators or structural support block valves and actuators. The immediate corrective proposed in the FMECA of the SSCA did not include maintenance actions such as the replacement of individual valves or actuators due to the extremely short time available for maintenance activities. The action to restore the system to a safe operational condition in the event of a single component failure in the SSCA was limited to diverting the flow to the sound branch line and effectively blocking the propellant flow in the branch line containing the malfunction. Final corrective action requires replacement of the SSCA module. The SSCVA requirements allocation sheets developed for engine assembly and checkout functions indicate no special facilities or equipment are required to replace an SSCVA. The equipment and facilities required are identical to those required to replace a CDA.

Repair/Replacement Analyses were not prepared for the Structural Support Coolant Assembly since the SSCA is part of the Structural Support Coolant System Module which is maintainable as a module. A repair/replacement analysis was prepared for the ground replacement of an SSCVA under non-hostile radiation environmental conditions. The results indicated no special tools or skills are required for the manual replacement of the SSCV actuator on the ground prior to reactor operation. The estimated time to replace an SSCVA is 64 minutes.

Figure 10.1. Structural Support Coolant Valve Actuator

11.0 NUCLEAR SUBSYSTEM INSTRUMENTATION

11.1 SYSTEM DESCRIPTION

The NSS Instrumentation consists of thermocouples; transducers for measurement of pressure, differential pressure, displacement, strain, vibration, neutron and gamma flux; and associated tubing and electrical leads. The components of the NSSI are used to measure selected parameters for the purpose of control, performance diagnostics, safety diagnostics, and collection of trend data.

11.2 REQUIREMENTS

The maintainability requirements for the NSSI are specified in the detailed specification for the NSSI, EC-677565 and the detailed specification of the NSS, CP-677555. The primary maintainability requirements are given below.

(1) NSSI components internal to the pressure vessel shall not be maintainable subsequent to assembly of the NSS and pressure vessel and closure subsystem.

(2) NSSI components external to the pressure vessel shall be manually and remotely maintainable.

11.3 ANALYSIS

Recent design development indicates that the neutronic transducers may be located external the pressure vessel. However, since a design concept has not been selected and mounting concepts not yet developed, maintainability analysis was not performed.

No other NSS instruments have been identified for location external to the pressure vessel.

APPENDIX A

Repair/Replacement Analysis

Table A-1 Control Drum Actuator-Preoperational

Table A-2 Control Drum Actuator-Post operational

Table A-3 SSCV Actuator-Preoperational

TABLE A-1
REPAIR/REPLACEMENT ANALYSIS
CONTROL DRUM ACTUATOR

1. <u>Part No./Description</u>	2. <u>Reference Drawing No.</u>	3. <u>References</u>
EC 677585/Control Drum Actuator	WANL Dwg. 939J990	N/A
CDA Recessed design with bolted flange as shown in Figure 1		
4. <u>Objective of Maintenance Activity</u>	5. <u>Prepared by</u>	<u>Date</u>
Replace a defective Control Drum Actuator prior to reactor operations at a ground test pad. (AMOD in either position)	H. B. Brown	9/21/70

MAINTENANCE REQUIREMENTS

A-2

6. <u>Maintenance</u>	7. <u>Skills</u>	8. <u>Man Min.</u>	<u>Est. Rep. Time</u>	9. <u>Tools</u>	10. <u>Remarks</u>
Disconnect actuator electrical connector.	R.A. Tech A	1	1	---	Manually push connector in and turn 1/2 turn counter clockwise to release.
Release actuator fasteners.	R.A. Tech A	3	3	Ratchet type socket wrench	---
Remove defective actuator and its captive fasteners and seal.	R.A. Tech A R.A. Tech C	5 5	5	---	---
* (Alignment of skip tooth on AMOD necessary if AMOD is fired.)	R.A. Tech A	*3	*3	---	This step and time will be deleted if AMOD has not been fired.

6. <u>Maintenance</u>	7. <u>Skills</u>	8. <u>Man Min.</u>	<u>Est. Rep. Time</u>	9. <u>Tools</u>	10. <u>Remarks</u>
Inspect visually the actuator drive shaft and the actuator/pressure vessel interface surfaces to assure their cleanliness and structural integrity.	R.A. Tech A R.A. Tech C	10 10	10	Hand mirror	Use hand mirror to inspect surfaces not directly visible.
* Reset the fired AMOD.	R.A. Tech A	*2	*2	---	---
Inspect the captive seal and mating surfaces of the replacement actuator.	R.A. Tech A	5	5	---	Control Drum Actuator EC 677585
Install replacement actuator.	R.A. Tech A	5	5	---	Aligned by pins. Caution: DO NOT TRIP AMOD.
Tighten actuator fasteners.	R.A. Tech A	3	3	Ratchet type socket wrench and torque wrench.	Must be tightened to proper torque.
Deform locking devices.	R.A. Tech C	1	1	Small mallet.	Locking devices must be bent to lock.
Replace actuator electrical connector.	R.A. Tech A	1	1	---	Prior to replacement, the connector should be visually inspected.

TABLE A-1 (CONT'D)

6. <u>Maintenance</u>	7. <u>Skills</u>	8. <u>Man Min.</u>	<u>Est Rep.</u> <u>Time</u>	9. <u>Tools</u>	10. <u>Remarks</u>
Check out the replacement actuator in the system. Record results on operational checkout sheets.	Reactor	30			
	Operator				
	Test	30	30	---	---
	Engineer				
	Electrical	30			
	Technician				
		11. <u>Total</u>	12. <u>Total</u>		
Without AMOD fired.		144	64		
With AMOD fired.		*149	*69		

TABLE A-1 (CONT'D)

TABLE A-2
REPAIR/REPLACEMENT ANALYSIS

CONTROL DRUM ACTUATOR

<u>1. Part No./Description</u>	<u>2. Reference Drawing No.</u>	<u>3. References</u>
EC 677585/Control Drum Actuator	WANL Dwg. 939J990	N/A
CDA Recessed design with bolted flange as shown in Figure 1.		
<u>4. Objective of Maintenance Activity</u>	<u>5. Prepared by</u>	<u>Date</u>
Replace a defective Control Drum Actuator during or after testing at a ground test pad.	H. B. Brown	9/21/70

MAINTENANCE REQUIREMENTS

<u>6. Maintenance</u>	<u>7. Skills</u>	<u>8. Man Min.</u>	<u>Est Rep. Time</u>	<u>9. Tools</u>	<u>10. Remarks</u>
Move shielding and manipulators(slave) into place.	R.A. Tech A Crane Operator Radiation Monitor Test Engineer	10 10 10 10	10	Special equip. (shield, remote manipulator, tools) Crane.	Special care must be taken here to shield workers from radiation.
Disconnect actuator electrical connector.	R.A. Tech A	10	10	Remote manipulator with special tool.	Manually push connector in and turn 1/2 turn counter clockwise to release.
Release actuator fasteners.	R.A. Tech A R.A. Tech C	30 30	30	Ratchet type socket wrench attached or held by remote manipulator.	---

TABLE A-2 (CONT'D)

6. <u>Maintenance</u>	7. <u>Skills</u>	8. <u>Man Min.</u>	<u>Est Rep. Time</u>	9. <u>Tools</u>	10. <u>Remarks</u>
Remove defective actuator and its captive fasteners and seal.	R.A. Tech A R.A. Tech C	50 50	50	Remote manipulator with actuator handling tool.	Actuator is irradiated; <u>must be placed in shielded container.</u>
* (Alignment of skip tooth on AMOD necessary if AMOD is fired.)	R.A. Tech A	*30	*30	Remote manipulator with special tool.	This step and time will be deleted if AMOD has not been fired.
Inspect visually the actuator drive shaft and the actuator/pressure vessel interface surfaces to assure their cleanliness and structural integrity.	R.A. Tech A R.A. Tech C	10 10	10	Periscope system	Use mirror to inspect surfaces not directly visible.
* Reset the fired AMOD.	R.A. Tech A	*20	*20	Remote manipulator with special tool.	---
Inspect the captive seal and mating surfaces of the replacement actuator.	R.A. Tech A	5	5	---	---
Install replacement actuator.	R.A. Tech A R.A. Tech C	50 50	50	Remote manipulator with handling tool.	Aligned by pins. Caution: DO NOT TRIP AMOD.
Tighten actuator fasteners.	R.A. Tech A R.A. Tech C	30 30	30	Ratchet type socket wrench and torque wrench attached or held by remote manipulator.	Must be tightened to proper torque.

TABLE A-2 (CONT'D)

6. <u>Maintenance</u>	7. <u>Skills</u>	8. <u>Man Min.</u>	<u>Est Rep.</u> <u>Time</u>	9. <u>Tools</u>	10. <u>Remarks</u>
Deform locking devices.	R.A. Tech A	10	10	Special tool attached or held by remote manipulator.	Locking devices must be bent to lock.
Replace actuator electrical connector.	R.A. Tech A	10	10	Remote manipulator with special tool.	Prior to replacement, the connector should be visually inspected.
Check out the replacement actuator in the system. Record results on operational checkout sheets.	Reactor Operator	30			
	Test Engineer	30	30	---	---
	Electrical Technician	30			
		11. <u>Total</u>	12. <u>Total</u>		
	Without AMOD fired.	505	265		
	With AMOD fired.	555	315		

TABLE A-3
REPAIR/REPLACEMENT ANALYSIS

SSCVA ACTUATOR

1. <u>Part No./Description</u>	2. <u>Reference Drawing No.</u>	3. <u>References</u>
EC 677576/Structural Support Coolant Valve Actuator SSCVA with bolted flange as shown in Figure 2	940J510	N/A
4. <u>Objective of Maintenance Activity</u>	5. <u>Prepared by</u>	<u>Date</u>
Replace a defective Structural Support Coolant Valve Actuator prior to reactor operations at a ground test pad.	B. W. Warner	10/8/70

MAINTENANCE REQUIREMENTS

6. <u>Maintenance</u>	7. <u>Skills</u>	8. <u>Man Min.</u>	<u>Est. Rep. Time</u>	9. <u>Tools</u>	10. <u>Remarks</u>
Disconnect actuator electrical connector	R.A. Tech A	1	1	---	Manually push connector in and turn 1/2 turn counter clockwise to release.
Release actuator fasteners	R.A. Tech A	3	3	Ratchet type socket wrench	---
Remove defective actuator and its captive fasteners and seal.	R.A. Tech A R.A. Tech C	5 5	5	---	---
Inspect visually the actuator drive shaft and the actuator/SSCV interface surfaces to assure their cleanliness and structural integrity.	R.A. Tech A	10	10	Hand mirror	Use hand mirror to inspect surfaces not directly visible.

TABLE A-3 (CONT'D)

6. <u>Maintenance</u>	7. <u>Skills</u>	8. <u>Man Min.</u>	<u>Est. Rep. Time</u>	9. <u>Tools</u>	10. <u>Remarks</u>
Inspect the captive seal and mating surfaces of the replacement actuator.	R.A. Tech A	5	5	---	SSCV Actuator EC-677575.
Install replacement actuator.	R.A. Tech A R.A. Tech C	5 5	5	---	Actuator aligned by guide pins to SSCV. An alignment of skip tooth on actuator coupling and valve drive shaft must be accomplished.
Tighten actuator fasteners.	R.A. Tech A	3	3	Ratchet type socket wrench and torque wrench.	Must be tightened to proper torque.
Deform locking devices.	R.A. Tech C	1	1	Small mallet.	Locking devices must be bent to lock.
Replace actuator electrical connector.	R.A. Tech A	1	1	---	Prior to replacement, the connector should be visually inspected.
Check out the replacement actuator in the system. Record results on operational checkout sheets.	Reactor Operator Test Engineer Electrical Technician	30 30 30	30	---	---
		11. <u>Total</u>	12. <u>Total</u>		
		144	64		

APPENDIX B

Block 8 Maintenance Analysis

END ITEM MAINTENANCE SHEET

REFERENCE FUNCTION NAME AND NUMBER 5.3 Assemble and Checkout S-N				INSTL STATUS (f)			MAINTENANCE FUNCTIONS (g)												MAINTENANCE LOCATION (h)										AGE ITEM NO. (j)	PROVISIONING PLANNING DATA (k)							
(a) LINE ITEM	(b) ITEM CONTROL NO.	(c) INDENTURE	(d) SUBSYSTEM END ITEM MANUFACTURER PART NO. AND NOMENCLATURE	(e) SERIAL NO. EFFECTIVITY	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10		1	2	3	4	5	6	
					SYSTEM INSTALLED	SUBSYSTEM ASSEMBLED	SUBSYSTEM DISASSEMBLED	TEST OR CHECKOUT	CALIBRATE - ADJUST	REMOVE - INSTALL	REPLACE	REPAIR - OVERHAUL	PROTECT - SERVICE	VISUAL CHECK / INSPECT	CLEAN - PURGE	SYSTEM ALIGN	STORE - HANDLE	MONITOR - OPERATE	OTHER	ANSC	WHL	E - MAD	TEST STAND	ASSEMBLY SITE	ACCEPTANCE SITE	VEHICLE ASSY BUILDING	LAUNCH PAD	PROPELLANT DEPOT	OTHER		SPARE RECOMMENDED	SPARE SOURCE	INTERCHANGEABLE - REPLACEABLE	QUANTITY ASSEMBLY	QUANTITY ARTICLE	SHELF LIFE	
	TBD	D	Control Drum Actuator (W)	ALL	X									V										X	X												
201						X																															
202						X				R													X	X													
203						X											H						X	X													
204						X						P											X	X													
205						X				R													X	X													
206						X							V										X	X													
207						X		T															X	X													
208						X									C								X	X													
209						X			I														X	X													
210						X							I										X	X													
211						X		C															X	X													

B-2

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assembly and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Control Drum Actuator - EC-677585

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
201-7	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to visually inspect each CDDA Actuator on the Engine for external defects.</p> <p>A visual check shall be made for the accumulation of contamination or buildup of corrosion that may contribute to a malfunction or impede the performance of maintenance.</p> <p>The surfaces shall meet the standards for cleanliness specified in <u>TBD</u>.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>A. <u>Maintainability</u></p> <p>The Engine design shall permit access to the CDDA Actuators after their installation for the purpose of the visual inspection of the individual actuators.</p> <p>B. <u>Functional</u></p> <p>None.</p> <p>C. <u>Physical</u></p> <p>None.</p> <p>D. <u>Interface</u></p> <p>None</p>			<p>I. <u>Environment</u></p> <p>A. <u>Temperature</u></p> <p>The temperature range shall be 76°F + 8°F (Personnel comfort)</p> <p>B. <u>Humidity</u></p> <p>The relative humidity shall be <u>TBD</u> % maximum.</p> <p>C. <u>Cleanliness</u></p> <p>Cleanliness per WANL Process Specification 294579-3 Rev. 2.</p> <p>D. <u>Illumination</u></p> <p>Illumination should be 30 foot candles minimum as measured at CDDA Actuator.</p> <p>II. <u>Utilities</u></p> <p>115 VAC, 40 AMPS, 60 cycles/sec.</p> <p>III. <u>Civil/Structural/Architectural</u></p> <p>TBD.</p> <p>IV. <u>Equipment</u></p> <p>Portable Light - Capable of producing 100 foot candles on a surface to be inspected.</p>					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 2 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N OR
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC-677585 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
201-7	<p>III. <u>Support System Requirements</u></p> <p>A. <u>Design Requirements</u> N/A.</p> <p>B. <u>Design Constraints</u> N/A.</p> <p>C. <u>Operability and Maintainability</u> Radiation detection and warning equipment should be provided to protect personnel from nuclear radiation. Individual dosimeters should be provided for each maintenance man. Radiation dosages for personnel shall not exceed requirements specified in AEC Manual L-0524.</p>		Radiation Detection Equipment						
202-3	<p>I. <u>Description of Maintenance Function</u></p> <p>A. A requirement exists to remove a CDDA actuator from the NSSM so as to effect a repair of the Nuclear Engine.</p> <p>B. There is also a requirement to detach the electrical connector of the wiring harness from the CDDA actuator.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>A. <u>Maintainability</u> The control drum actuator shall be designed in such a manner as to permit manual removal and replacement without disturbing other Engine components.</p>		Hand mirror Ratchet type socket wrench	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 3 OF 75

REQUIREMENTS ALLOCATION SHEET (CONTINUED)

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator EC-677585

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE) (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE) (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.
202-3	<p>A. <u>Maintainability</u> (Continued)</p> <p>The attachment fasteners of the CDDA actuator shall be captive to the actuator module.</p> <p>The electrical connector for the CDDA Actuator should be designed as a quick disconnect type.</p>						
202-3	<p>B. <u>Functional</u></p> <p>The CDDA Actuators shall be directly and completely interchangeable with respect to performance.</p> <p>C. <u>Physical</u></p> <p>A CDDA Actuator module weighs approximately 10 lbs. and has an envelope of approximately 7.40 inches long X 3.5 inches radius.</p> <p>D. <u>Interface</u></p> <p>N/A</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements Section III, CDDA Actuator.</p>						

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 4 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N OR
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator EC-677585 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EOPT REQTS (F4)	
203-10	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to handle the CDDA Actuator during removal and storage.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>A. <u>Maintainability</u></p> <p>The attachment fasteners and interface seals shall be captive to the Actuator.</p> <p>B. <u>Functional</u></p> <p>N/A</p> <p>C. <u>Physical</u></p> <p>N/A</p> <p>D. <u>Interface</u></p> <p>N/A</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements Section III, CDDA Actuator</p>		Storage container for CDDA Actuator	Reference RAS 5.3 Line Item 201-7, CDDA Actuator.					
204-6	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to protect the Engine at the CDDA Actuator/pressure vessel interface surfaces both internal and external when the CDDA actuator is removed.</p> <p>These surfaces should be protected from environmental conditions and physical damage.</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 5 OF 75

B-6

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator EC-677585

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
204-6	<p>A means must be devised to protect the Engine from corrosion and contamination after the CDDA actuator is removed.</p> <p>A means must be found to protect the removed CDDA actuator from physical damage, contamination, and deleterious environmental conditions.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>None</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements Section III, CDDA Actuator.</p>		<p>Protective Cover Kit</p> <p>Protective Container</p>						
205-4	<p>I. <u>Description of Maintenance Function</u></p> <p>There is a requirement to replace a faulty CDDA actuator that has been removed from the engine with a serviceable unit.</p> <p>There is a requirement to obtain a serviceable module from spares inventory and transfer it to the Engine.</p> <p>There is a requirement to unpackage the spare CDDA Actuator, determine that it is a serviceable unit and prepare it for installation on the Engine.</p> <p>A requirement exists to protect the faulty actuator per line item 204-6, prepare it for shipment and transport it to WANL facility for disposition.</p>			Reference RAS 5.3 Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 6 OF 75

B-7

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator EC-677585

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
205-4	<p>II. <u>End Item Design Characteristics</u></p> <p>A. <u>Maintainability</u></p> <p>N/A</p> <p>B. <u>Functional</u></p> <p>The requirement exists for the replacement module to be functionally interchangeable with the faulty module.</p> <p>C. <u>Physical</u></p> <p>The requirement exists to verify that the replacement module is properly identified, that it is a qualified replacement module, and that it is physically interchangeable with the faulty module that has been removed.</p> <p>III. <u>Support System Requirements</u></p> <p>N/A</p>								
206-7	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to visually inspect the replacement CDDA actuator module prior to its installation on the Engine.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>Reference RAS 5.3 Design Requirements Section II, Line Item 201-7, CDDA Actuator.</p>			Reference RAS 5.3 Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 7 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator EC-677585

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
206-7	III. <u>Support System Requirements</u> Reference RAS 5.3, Line Item 201-7, Design Requirements Section III, CDDA Actuator.			I. <u>Environment</u> A. <u>Temperature</u> Reference RAS 5.3, Line Item 201-7 CDDA Actuator.					
207-1	I. <u>Description of Maintenance Function</u> The requirement exists to functionally check the replacement CDDA Actuator before installation on the Engine. II. <u>End Item Design Characteristics</u> N/A III. <u>Support System Requirements</u> A. <u>Design Requirements</u> A means of performing functional tests on a replacement CDDA actuator prior to its installation in the Engine is required. B. <u>Design Constraints</u> N/A C. <u>Operability and Maintainability</u> Reference RAS 5.3 Line Item 201-7, Design Requirements Section III C, CDDA Actuator.			B. <u>Humidity</u> Reference RAS 5.3 Line Item 201-7, CDDA Actuator. C. <u>Cleanliness</u> Cleanliness per WANL Process Specification 294579-4 Rev. 2 D. <u>Illumination</u> Reference RAS 5.3, Line Item 201-7, CDDA Actuator. II. <u>Utilities</u> 115 V AC, 40 Amps, 60 cycles/sec. III. <u>Civil/Structural/Architectural</u> A clean room is required in the facility with an area _____ ft. X _____ ft. X _____ ft. IV. <u>Equipment</u> A bench test stand equipped to functionally check the CDDA Actuator must be provided.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 8 OF 75

B-9

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assembly and Checkout S-N OR
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator EC-677585 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
208-8	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to clean the CDDA Actuator mounting surfaces to remove any corrosion or contamination that may contribute to a malfunction or impede the performance of maintenance.</p> <p>The cleaning process shall follow the procedures specified in <u>TBD</u>.</p> <p>The surfaces shall meet the standards for cleanliness specified in <u>TBD</u>.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>A. <u>Maintainability</u></p> <p>The Engine design shall permit access to the CDDA actuator mounting surfaces for the purpose of cleaning them.</p> <p>B. <u>Functional</u></p> <p>N/A</p> <p>C. <u>Physical</u></p> <p>N/A</p> <p>D. <u>Interface</u></p> <p>N/A</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 1 OF 75

B-10

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator EC-677585

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
209-3	<p>I. <u>Description of Maintenance Function</u></p> <p>A. A requirement exists to install a replacement CDDA Actuator on the Engine whenever a faulty unit is removed.</p> <p>B. There is also a requirement to attach the electrical connector of the wiring harness to the CDDA Actuator.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>Reference RAS 5.3, Line Item 202-3, Design Requirements Section II, CDDA Actuator.</p>		Hand Mirror Ratchet type socket wrench torque wrench small mallet	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					
209-3	<p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3 Design Requirements Section II, Line Item 201-7, CDDA Actuator.</p>								
210-7	<p>I. <u>Description of Maintenance Function</u></p> <p>The requirement exists to inspect the CDDA Actuator after it is installed to verify the completion of the repair and the quality of workmanship.</p> <p>The inspection will assure the following:</p> <ol style="list-style-type: none"> Proper mounting of the CDDA actuator and its attachment devices. Security of the CDDA actuator on the Engine. Proper torquing of mechanical fasteners and installation of locking devices for the fasteners if applicable. Agreement with Contamination/and Corrosion Control specifications. 			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 10 OF 75

B-11

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator EC-677585

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
210-7	<p>II. <u>End Item Design Characteristics</u></p> <p>Reference RAS 5.3, Design Requirements Section II, Line Item 201-7, CDDA Actuator.</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Design Requirements Section III, Line Item 201-7, CDDA Actuator.</p>								
211-1	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to perform a checkout of the CDDA Actuator after it is installed.</p> <p>An electrical continuity check will be made to verify the integrity of the electrical connections. A functional check of the installed actuator and its associated control drum will be performed to verify the capability of running the actuator through the reactor control system.</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					
211-1	<p>II. <u>End Item Design Characteristics</u></p> <p>Reference RAS 5.3, Design Requirements Section II Line Item 201-7, CDDA Actuator.</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Design Requirements Section III, Line Item 201-7, CDDA Actuator.</p>								

B-12

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 11 OF 75

END ITEM MAINTENANCE SHEET

REFERENCE FUNCTION NAME AND NUMBER 4.2 Mate S-N to S-II				INSTL STATUS (i)			MAINTENANCE FUNCTIONS (g)												MAINTENANCE LOCATION (h)										AGE ITEM NO. (j)	PROVISIONING PLANNING DATA (k)					
(a)	(b)	(c)	(d)	(e)	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6
LINE ITEM	ITEM CONTROL NO.	INDENTURE	SUBSYSTEM END ITEM MANUFACTURERS PART NO. AND NOMENCLATURE	SERIAL NO. EFFECTIVITY	SYSTEM INSTALLED	SUBSYSTEM ASSEMBLED	TEST OR CHECKOUT	CALIBRATE-ADJUST	REMOVE-INSTALL	REPLACE	REPAIR-OVERHAUL	PROTECT-SERVICE	VISUAL CHECK/INSPECT	CLEAN-PURGE	SYSTEM ALIGN	STORE-HANDLE	MONITOR-OPERATE	OTHER	ANSC	WHL	E-MAD	TEST STAND	ASSEMBLY SITE	ACCEPTANCE SITE	VEHICLE ASSY BUILDING	LAUNCH PAD	PROPELLANT DEPOT	OTHER	SPARE RECOMMENDED	SPARE SOURCE	INTERCHANGEABLE-REPLACEMENT	QUANTITY ASSEMBLY	QUANTITY ARTICLE	SHELF LIFE	
	T8D	D	Control Drum Drive Actuator	All	X								V																						
201						X																			X										
202						X			R																X										
203						X											H							X											
204						X						P												X											
205						X			R															X											
206						X							V											X											
207						X	T																	X											
208						X								C										X											
209						X		I																X											
210					X								I											X											
211					X		C																	X											

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-II OR
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
201-7	Design requirements identical to those on RAS Sheets Function 5.3, Assemble and Checkout S-N, Line Item 201-7, CDDA Actuator.		Reference RAS 5.3, Line Item 201-7; CDDA Actuator	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 13 OF 75

B-14

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-II
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENTS (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
202-3	Design requirements identical to those shown on RAS Sheets, Function Block 5.3, Assemble and Checkout S-N, Line Item 202-3, CDDA Actuator.		Hand mirror Ratchet type socket wrench	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 14 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-II
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
203-10	Design requirements identical to those shown on RAS Sheets, Block 5.3, Assemble and Checkout S-N, Line Item 203-10, CDDA Actuator.		Storage container for CDDA Actuator	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 15 OF 75

B-16

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-II

OR

NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC677585

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
204-6	Design requirements are identical to those shown on RAS Sheets in Function Block 5.3, Assemble and Checkout S-N, Line Item 204-6, CDDA Actuator.		Reference RAS 5.3 Line Item 204-6, CDDA Actuator	Reference RAS Sheets 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 16 OF 75

B-17

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER _____

4.2 Mate S-N to SII

OR

NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENTS (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
205-4	Design Requirements are identical to those shown on RAS Sheets, Block 5.3, Assemble and Checkout S-N, Line Item 205-4, CDDA Actuator.			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 17 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-II

OR

NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
206-7	Design requirements are identical to those shown in Function Block RAS 5.3, Assemble and Checkout S-N, Line Item 206-7, CDDA Actuator.			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 18 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-II OR
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
207-1	Design requirements are identical to those shown on RAS Sheets, Function Block 5.3, Assemble and Checkout S-N, Line Item 207-1, CDDA Actuator.			Reference RAS 5.3, Line Item 207-1, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 19 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-II OR

NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
208-8	Design requirements are identical to those shown on RAS Sheets for Function Block 5.3, Assemble and Checkout S-N, Line Item 208-8, CDDA Actuator.			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 20 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11 OR
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
209-3	Design Requirements are identical to those shown on RAS Sheets for Function Block 5.3, Assemble and Checkout S-N, Line Item 209-3, CDDA Actuator.		Hand mirror Ratchet type socket wrench Torque wrench Small mallet	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 21 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-II
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585

OR
 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
210-7	Design requirements are identical to those RAS Sheets 5.3, Assemble and Checkout S-N, Line Item 210-7, CDDA Actuator.			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 22 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-II OR
 NOMENCLATURE AND NUMBER OF CEI Control Drum Drive Actuator - EC 677585 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
211-1	Design requirements are identical to those RAS Sheets for Function Block 5.3, Assemble and Checkout S-N, Line Item 211-1, CDDA Actuator.			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 23 OF 75

END ITEM MAINTENANCE SHEET

REFERENCE FUNCTION NAME AND NUMBER 5.3 Assemble and Checkout S-N				INSTL STATUS (f)	MAINTENANCE FUNCTIONS (g)												MAINTENANCE LOCATION (h)										AGE ITEM NO. (j)	PROVISIONING PLANNING DATA (k)								
(a) LINE ITEM	(b) ITEM CONTROL NO.	(c) INDENTURE	(d) SUBSYSTEM END ITEM MANUFACTURERS PART NO. AND NOMENCLATURE	(e) SERIAL NO EFFECTIVITY	1 SYSTEM INSTALLED	2 SUBSYSTEM ASSEMBLED	3 SUBSYSTEM DISASSEMBLED	4 TEST OR CHECKOUT	5 CALIBRATE-ADJUST	6 RE MOVE-INSTALL	7 REPLACE	8 REPAIR-OVERHAUL	9 PROTECT-SERVICE	10 VISUAL CHECK/INSPECT	11 CLEAN-PURGE	12 SYSTEM ALIGN	13 STORE-HANDLE	14 MONITOR-OPERATE	15 OTHER	16 AMSC	17 WAML	18 E-MAD	19 TEST STAND	20 ASSEMBLY SITE	21 ACCEPTANCE SITE	22 VEHICLE ASSY BUILDING	23 LAUNCH PAD	24 PROPELLANT DEPOT	25 OTHER	1 SPARE RECOMMENDED	2 SPARE SOURCE	3 INTERCHANGEABLE-REPLACEMENT	4 QUANTITY ASSEMBLY	5 QUANTITY ARTICLE	6 SHELF LIFE	
	TBD	D	Nuclear Subsystem Module	All	X																															
212					X									V										X	X											
213						X				R													X	X												
214						X											H						X	X												
215						X							P										X	X												
216						X					R												X	X												
217						X								V									X	X												
218						X									P								X	X												
219						X									C								X	X												
220						X				I													X	X												
221					X									I									X	X												
222					X			C															X	X												

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555

— OR
 — (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENTS (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
212-7	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to visually inspect the NSSM of the Engine for external defects. A visual check shall be made for the accumulation of contamination or the buildup of corrosion on the components of NSSM which may contribute to a malfunction or impede the performance of maintenance.</p> <p>The surfaces of the NSSM shall meet the standards for cleanliness specified in TBD.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>A. Maintainability</p> <p>The Engine design shall permit access to inspect the NSS components which are external to the reactor assembly/pressure vessel/nozzle.</p> <p>B. Functional</p> <p>None</p> <p>C. Physical</p> <p>None</p> <p>D. Interface</p> <p>None</p> <p>III. <u>Support System Requirements</u></p> <p>A. Design Requirements</p> <p>N/A</p> <p>B. <u>Design Constraints</u></p> <p>N/A</p>		Work platforms Portable lights	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 25 OF 75

B-26

REQUIREMENTS ALLOCATION SHEET (CONTINUED)

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N

OR

NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE)(C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE)(C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.				NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.
212-7 (Cont'd)	C. Operability and Maintainability Radiation Detection Equipment - Personnel safety from nuclear radiation shall be provided as per Design Requirements III.C, Line Item 201-7, CDDA Actuator of RAS Sheet 5.3		Radiation Detection Equipment 1 / 1 / 1 / 1 / 1				

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 26 OF 75

B-27

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP-677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
213-3	<p><u>I. Description of Maintenance Function</u></p> <p>A requirement exists to disconnect and remove NSSM (Nuclear Subsystem Module) from the Engine in order to affect a refurbishment of the Engine.</p> <p>This action will include:</p> <ol style="list-style-type: none"> 1. The electrical connections to the NSSM from the Engine instrumentation and control system must be disconnected. 2. The nozzle and nozzle skirt extension must be removed from the Engine. 3. The piping connections between the NSSM and the other Engine components must be broken. <p><u>II. End Item Design Characteristics</u></p> <p>A. Maintainability</p> <ol style="list-style-type: none"> 1. Engine design shall provide access to NSSM in order to facilitate its removal and replacement. 2. Attaching hardware that does require special tools and equipment should be provided wherever practical. <p>B. Functional N/A</p> <p>C. Physical The NSSM weighs approximately 18,000 lbs and has an envelope of approximately TBD.</p> <p>D. Interface N/A</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 27 OF 75

B-28

REQUIREMENTS ALLOCATION SHEET (CONTINUED)

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout - S-N
NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP-677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE) (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT	FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE)(C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT
			IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.				IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO
213-3 (Cont'd)	III. <u>Support System Requirements</u> A. Design Requirements A means is required to disconnect/connect and remove/place the NSSM from/on the engine. A support stand is required. B. Design Constraints N/A C. Operability and Maintainability Reference RAS 5.3, Line Item 201-7, CDDA Actuator, Design Requirements Section III.C.		Lifting sling 20,000 lbs NSSM support stand Radiation detec- tion system				

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 28 OF 75

B-29

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP-677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
214-10	<p>I. <u>Description of Maintenance Function</u> A requirement exists to handle the NSSM during its removal and storage.</p> <p>II. <u>End Item Design Characteristics</u> A. Maintainability The NSSM shall have attachment points for the lifting sling. B. Functional N/A C. Physical N/A D. Interface N/A</p> <p>III. <u>Support System Requirements</u> Reference RAS 5.3, Line Item 213-3, Nuclear Subsystem Module, Design Requirements, Section III.</p>		20,000 lbs lifting sling	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 29 OF 75

B-30

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N OR
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
215-6	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to protect the Engine from environmental and physical damage when the NSSM is removed.</p> <p>A requirement exists to protect the defective NSSM after disassembly from the Engine from physical damage, contamination, and deleterious environmental conditions.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>None</p> <p>III. <u>Support System Requirements</u></p> <p>A. Design Requirements</p> <ol style="list-style-type: none"> The nozzle flange and pressure vessel must be protected. The control drum actuator mounting bosses must be covered. The propellant and coolant line openings must be covered. A storage container is required for the NSSM after removal from Engine. A means should be provided to protect the internal and external Engine and NSSM surfaces from contamination and corrosion. <p>B. Design Constraints</p> <ol style="list-style-type: none"> Physical <p>The protective devices shall be fabricated from a material that will not mar or damage the machined mating surfaces, will not contribute to a</p>		<p>Nozzle flange cover plate</p> <p>Pressure vessel Cover plate kit</p> <p>Cover plate kit</p> <p>NSSM storage container</p> <p>Purge lines for NSSM</p> <p>Purge lines for Engine</p> <p>ANSC RAS 4.2 Line Item 23, NERVA Engine</p>	<p>I. <u>Environment</u></p> <p>The environment is the same as described in Facility Requirements Section I, Line Item 201-7, RAS 5.3, CDDA Actuator.</p> <p>II. <u>Utilities</u></p> <ol style="list-style-type: none"> GN₂ supply - 50 psig at 100 scfm. 115 VAC, 40 Amps, 60 cycles/sec. <p>III. <u>Civil/Structural/Architectural</u></p> <p>TBD</p> <p>IV. <u>Equipment</u></p> <p>Overhead crane (20 ton capacity)</p> <p>Lifting sling (20,000 lbs capacity)</p>					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 30 OF 75

B-31

REQUIREMENTS ALLOCATION SHEET (CONTINUED)

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE) (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE) (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.				NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.
215-6 (Cont'd)	<p>buildup of electrostatic charges and will not react with dissimilar materials., The design shall provide attaching fastening devices for securing in place.</p> <p>2. Interface</p> <p>The protective means shall interface with the mounting surfaces/flanges of all engine components, modules, or subsystems being protected.</p> <p>3. Special Considerations</p> <p>The protective means shall be designed to preclude any component being assembled on the Engine with the protective devices installed.</p> <p>C. Operability and Maintainability</p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements Section III.C, CDDA Actuator.</p>		Radiation Detection Equipment				

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 31 OF 75

B-32

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
216-4	<p>I. <u>Description of Maintenance Function</u></p> <p>There is a requirement to replace a defective NSSM which has been removed from the Engine assembly with a sound NSSM.</p> <p>There is a requirement to obtain a serviceable module from inventory and transfer it to the engine.</p> <p>There is a requirement to unpack the replacement NSSM, determine if it is a serviceable unit and prepare it for installation on the Engine.</p> <p>A requirement exists to protect the faulty NSSM per Line Item 215-6, prepare it for shipment, and transport it to WANL facility for disposition.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>A. Maintainability N/A</p> <p>B. Functional</p> <p>The replacement NSSM shall be functionally interchangeable with the faulty NSSM.</p> <p>C. Physical</p> <p>The replacement NSSM must be properly identified, a qualified replacement NSSM, and physically interchangeable with the faulty NSSM which has been removed.</p> <p>III. <u>Support System Requirements</u> N/A</p>		<p>Lifting sling 20,000 lb capacity</p> <p>NSSM Storage container Lifting sling 20,000 lb capacity</p>	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 32 OF 75

B-33

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
217-7	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to visually inspect the replacement NSSM prior to its installation in the Engine.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>Reference RAS 5.3, Line Item 212-7, Design Requirements, Section II, Nuclear Subsystem Module.</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements, Section III, CDDA Actuator.</p>		Working platforms Portable lights	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 33 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
218-8	<p>I. <u>Description of Maintenance Function</u></p> <p>The requirement exists to purge the replacement NSSM at all times upon receipt at the site until installation in the Engine.</p> <p>The requirement also exists to purge the defective NSSM which has been removed from the Engine.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>None</p> <p>III. <u>Support System Requirements</u></p> <p>A. <u>Design Requirements</u></p> <p>A means must be provided to purge the replacement NSSM as well as the defective NSSM.</p> <p>B. <u>Design Constraints</u></p> <p>N/A</p> <p>C. <u>Operability and Maintainability</u></p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements, Section III.C, CDDA Actuator.</p>		NSSM purge lines	<p>I. <u>Environment</u></p> <p>Reference RAS 5.3, Facility Requirements, Section I, Line Item 201-7, CDDA Actuator.</p> <p>II. <u>Utilities</u></p> <p>115 V.A.C., 40 Amps, 60 cycles, GN₂: 50 psig at 50 scfm.</p> <p>III. <u>Civil/Structural/Architectural</u></p> <p>None</p> <p>IV. <u>Equipment</u></p> <p>TBD</p>					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 34 OF 75

B-35

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
219-8	<p>I. <u>Description of Maintenance Function</u></p> <p>The requirement exists to clean the NSSM/Engine mating surfaces to remove any accumulation of contamination or corrosion which might contribute to a malfunction or impede the performance of maintenance. The cleaning process shall follow the procedures specified in TBD. The surfaces shall meet the standards for cleanliness specified in TBD.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>A. Maintainability</p> <p>The Engine design shall permit access to the NSSM mounting surfaces for the purpose of cleaning them.</p> <p>B. Functional</p> <p>N/A</p> <p>C. Physical</p> <p>N/A</p> <p>D. Interface</p> <p>N/A</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements, Section III, CDDA Actuator.</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 34 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TIME EQUIPMENT REQUIREMENTS (F)				PROCEDURAL DATA REQUIS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQUIS (F3)	TRAINING AND REQUIS (F4)	
220-3	<p>I. <u>Description of Maintenance Function</u></p> <p>The requirement exists to install the replacement NSSM in the Engine whenever a faulty NSSM is removed.</p> <p>The requirement exists to attach the electrical connections from the Engine to NSSM.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>Reference RAS 5.3, Line Item 213-3, Design Requirements, Section II, Nuclear Subsystem Module.</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Line Item 213-3, Design Requirements, Section III, Nuclear Subsystem Module.</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 36 OF 75

B-37

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N G11
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555 (F)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				EQUIPMENT REQUIREMENTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING OPT REQTS (F4)	
221-7	<p><u>I. Description of Maintenance Function</u></p> <p>The requirement exists to inspect the NSSM after it is installed in the Engine to verify the completion of the repair and the quality of workmanship.</p> <p>The inspection will verify the following:</p> <ol style="list-style-type: none"> 1. Proper mounting of NSSM in the Engine and its attachment hardware. 2. Security of the NSSM on the Engine. 3. Proper torquing of mechanical fasteners. 4. Installation of locking devices for the fasteners where required. 5. Agreement with contamination and corrosion control specifications. <p><u>II. End Item Design Characteristics</u></p> <p>Reference RAS 5.3, Line Item 213-7, Design Requirements, Section II, Nuclear Subsystem Module.</p> <p><u>III. Support System Requirements</u></p> <p>Reference RAS 5.3, Line Item 213-7, Design Requirements, Section III, Nuclear Subsystem Module.</p>		Work platforms Portable lights	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 37 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N OR
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - CP 677555 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
222-1	<p>I. <u>Description of Maintenance Function</u></p> <p>There is a requirement to checkout the NSSM along with the Engine after the completion of the Engine assembly. There are no special design requirements for the NSSM checkout at this level.</p> <p>The design requirements are the same as those described for the Engine Checkout in RAS Sheet 4.2, Line Item 25, NERVA Engine CP 90290.</p>		Reference RAS 4.2, NERVA Engine Line Item 25	Reference RAS 4.2, NERVA Engine CP 90290, Line Item 25.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 38 OF 75

B-39

END ITEM MAINTENANCE SHEET

REFERENCE FUNCTION NAME AND NUMBER 4.2 Mate S-N to S11					INSTL STATUS (f)	MAINTENANCE FUNCTIONS (g)												MAINTENANCE LOCATION (h)										AGE ITEM NO. (i)	PROVISIONING PLAN (j)						
(a) LINE ITEM	(b) ITEM CONTROL NO.	(c) INDENTURE	(d) SUBSYSTEM, END ITEM, MANUFACTURER, PART NO. AND NOMENCLATURE	(e) SERIAL NO. EFFECTIVITY	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6
					SYSTEM INSTALLED	SUBSYSTEM ASSEMBLED	SUBSYSTEM DISASSEMBLED	TEST OR CHECKOUT	CALIBRATE-ADJUST	REMOVE-INSTALL	REPLACE	REPAIR-OVERHAUL	PROTECT-SERVICE	VISUAL CHECK/INSPECT	CLEAN-PURGE	SYSTEM ALIGN	STORE-HANDLE	MONITOR-OPERATE	OTHER	AWSC	MANL	TEST STAND	ASSEMBLY SITE	ACCEPTANCE SITE	VEHICLE ASSEMBLING	LAUNCH PAD	INTELLIGENT DEPOSIT	OTHER							
	TBD	D	Nuclear Subsystem Module	ALL																															
212					X									V																					
213						X				R																									
214						X											H																		
215						X							P																						
216						X				R																									
217						X								V																					
218						X									P																				
219						X									C																				
220						X				I																									
221						X								I																					
222						X		C																											

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11 OR
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - EC 677555 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
212-7	Design Requirements are identical to those in RAS 5.3, Line Item 212-7, Nuclear Subsystem Module		Reference RAS 5.3, Line Item 212-7, Nuclear Subsystem Module	Reference RAS 5.3 Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 40 OF 75

B-41

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11

OR

NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - EC-677555

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
213-3	Design Requirements are identical to those shown on RAS 5.3, Line Item 213-3, Nuclear Subsystem Module.		Reference RAS 5.3, Line Item 213-3, Nuclear Subsystem Module.	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 44 OF 75

B-42

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S - N to S11 OR
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module EC-677555 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
214-10	Design Requirements are identical to those shown on RAS 5.3, Line Item 214-10, Nuclear Subsystem Module		Reference RAS 5.3, Line Item 214-10, Nuclear Subsystem Module	Reference 5.3, Line Item 201-7 CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 42 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module EC-677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
215-6	Design Requirements are identical to those shown on RAS 5.3, Line Item 215-6, Nuclear Subsystem Module		Reference RAS 5.3, Line Item 215-6, Nuclear Subsystem Module	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 43 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11 OR
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
216-4	Design Requirements are identical to those shown on RAS 5.3, Line Item 216-4, Nuclear Subsystem Module		Reference RAS 5.3, Line Item 216-4, Nuclear Subsystem Module	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 44 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mare S-N to S11 OR
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module EC-677555 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
217-7	Design Requirements are identical to those shown on RAS 5.3, Line Item 217-7, Nuclear Subsystem Module /		Reference RAS 5.3, Line Item 217-7, Nuclear Subsystem Module	Reference RAS 5.3, Line Item 201-7, CDDA Actuator 					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 45 OF 75

B-46

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11 OR
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - EC-677555 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
218-8	Design Requirements are identical to those shown on RAS 5.3, Line Item 218-8, Nuclear Subsystem Module		Reference RAS 5.3, Line Item 218-8, Nuclear Subsystem Module	Reference RAS 5.3 Line Item 218-8, Nuclear Subsystem Module					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 46 OF 75

B-47

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11 OR
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - EC-677555 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
219-8	Design Requirements are identical to those shown on RAS 5.3, Line Item 219-8, Nuclear Subsystem Module			Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 47 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11

NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - EC-677555

OR

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENTS (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
220-3	Design Requirements are identical to those shown on RAS 5.3, Line Item 220-3, Nuclear Subsystem Module /			Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 48 OF 75

B-49

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11 OR
 NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - EC-677555 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
221-7	Design Requirements are identical to those shown on RAS 5.3, Line Item 221-7, Nuclear Subsystem Module		Reference RAS 5.3, Line Item 221-7, Nuclear Subsystem Module	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 49 OF 75

B-50

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11

NOMENCLATURE AND NUMBER OF CEI Nuclear Subsystem Module - EC-677555

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
222-1	<p>I. <u>Description of Maintenance Function</u></p> <p>There is a requirement to checkout the NSSM along with the Engine after completion of Engine Assembly.</p> <p>There are no special design requirements for the NSSM checkout at this level. The design requirements are the same as those described for the Engine Checkout, RAS 4.2, Line Item 25, NERVA Engine.</p>		Reference RAS 4.2, NERVA Engine, Line Item 25.	Reference RAS 4.2, NERVA Engine, Line Item 25.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 50 OF 75

END ITEM MAINTENANCE SHEET

REFERENCE FUNCTION NAME AND NUMBER 5.3 Assemble and Checkout S-N				INSTL STATUS (f)	MAINTENANCE FUNCTIONS (g)												MAINTENANCE LOCATION (h)										AGE ITEM NO. (j)	PROVISIONING PLANNING DATA (k)						
(a) LINE ITEM	(b) ITEM CONTROL NO.	(c) INDENTURE	(d) SUBSYSTEM END ITEM MANUFACTURER PART NO. AND NOMENCLATURE	(e) SERIAL NO. EFFECTIVITY	1 SYSTEM INSTALLED	2 SUBSYSTEM ASSEMBLED	3 SUBSYSTEM DISASSEMBLED	1 TEST OR CHECKOUT	2 CALIBRATE-ADJUST	3 RE MOVE-INSTALL	4 REPLACE	5 REPAIR-OVERHAUL	6 PROTECT-SERVICE	7 VISUAL CHECK/INSPECT	8 CLEAN-PURGE	9 SYSTEM ALIGN	10 STORE-HANDLE	11 MONITOR-OPERATE	12 OTHER	1 ANSC	2 WHL	3 E-MAD	4 TEST STAND	5 ASSEMBLY SITE	6 ACCEPTANCE SITE	7 VEHICLE ASSY BUILDING	8 LAUNCH PAD	9 PROPELLANT DEPOT	10 OTHER	2 Spare Source	3 Interchangeable-Replaceable	4 Quantity Assembly	5 Quantity Article	6 Shelf Life
	EC 677576	D	SSCV Actuator	All	X									V										X	X									
281						X																		X	X									
282							X			R														X	X									
283							X										H							X	X									
284							X						P											X	X									
285							X				R													X	X									
286							X							V										X	X									
287							X		T															X	X									
288							X									C								X	X									
289							X			I														X	X									
290							X							I										X	X									
291							X		C															X	X									

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____

PAGE 51 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
281-7	<p><u>I. Description of Maintenance Function</u></p> <p>A requirement exists to visually inspect each SSCV Actuator on the Engine for external defects.</p> <p>A visual check shall be made for the accumulation of contamination or buildup of corrosion that may contribute to a malfunction or impede the performance of maintenance.</p> <p>The surfaces shall meet the standards for cleanliness specified in TBD.</p> <p><u>II. End Item Design Characteristics</u></p> <p>A. Maintainability</p> <p>The Engine design shall permit access to the SSCV Actuators after their installation for the purpose of the visual inspection of the individual actuators.</p> <p>B. Functional</p> <p>None</p> <p>C. Physical</p> <p>None</p> <p>D. Interface</p> <p>None</p> <p><u>III. Support Systems Requirements</u></p> <p>A. Design Requirements</p> <p>N/A</p> <p>B. Design Constraints</p> <p>N/A</p>		Reference RAS 5.3, Line Item 201-7, CDDA Actuator	Facility requirements identical to RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 52 OF 75

B-53

REQUIREMENTS ALLOCATION SHEET (CONTINUED)

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE) (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (TYPE) (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.				NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.
281-7 (Cont'd)	<p>C. Operability and Maintainability</p> <p>Radiation detection and warning equipment should be provided to protect personnel from nuclear radiation. Individual dosimeters should be provided for each maintenance man. Radiation dosages for personnel shall not exceed requirements specified in AEC Manual 0524.</p>						

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 53 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N OR
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
282-3	<p>I. <u>Description of Maintenance Function</u></p> <p>A. A requirement exists to remove a SSCV Actuator from the NSSM so as to effect a repair of the Nuclear Engine.</p> <p>B. There is also a requirement to detach the electrical connector of the wiring harness from the SSCV Actuator.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>A. Maintainability</p> <p>The Structural Support Coolant Valve Actuator shall be designed in such a manner as to permit manual removal and replacement without disturbing other Engine components.</p> <p>The attachment fasteners of the SSCV Actuator shall be captive to the actuator module.</p> <p>The electrical connector for the SSCV Actuator should be designed as a quick disconnect type.</p> <p>B. Functional</p> <p>The SSCV Actuators shall be directly and completely interchangeable with respect to performance.</p> <p>C. Physical</p> <p>A SSCV Actuator module weighs approximately 18 lbs and has an envelope of approximately 9.20 inches long x 3.5 inches radius.</p> <p>D. Interface</p> <p>N/A</p> <p>III. <u>Support System Requirements</u></p> <p>Personnel safety requirements per reference RAS 5.3, Line Item 201-7, CDDA Actuator Design Requirements, Section III.</p>		<p>Hand mirror Ratchet mirror socket wrench</p>	<p>Reference RAS 5.3, Line Item 201-7, CDDA Actuator</p>					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 54 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator EC-677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
283-10	<p>I. <u>Description of Maintenance Function</u> A requirement exists to handle the SSCV Actuator during removal and storage.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>A. Maintainability The attachment fasteners and interface seals shall be captive to the actuator.</p> <p>B. Functional N/A</p> <p>C. Physical N/A</p> <p>D. Interface N/A</p> <p>III. <u>Support System Requirements</u> Reference RAS 5.3, Line Item 201-7, Design Requirements, Section III, CDDA Actuator.</p>		Storage container for SSCV Actuator	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 55 OF 75

B-56

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N

OR

NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
284-6	<p>I. Description of Maintenance Function</p> <p>A requirement exists to protect the Engine at the SSCV Actuator/SSCV Interface Flanges whenever SSCV Actuator is removed.</p> <p>The interface surfaces should be protected from environmental conditions and physical damage.</p> <p>A means must be devised to protect the Engine from corrosion and contamination after the SSCV actuator is removed.</p> <p>A means must be found to protect the removed SSCV Actuator from physical damage, contamination, and deleterious environmental conditions.</p> <p>II. End Item Design Characteristics</p> <p>None</p> <p>III. Support System Requirements</p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements, Section III, CDDA Actuator.</p>		<p>Protective cover kit</p> <p>Protective container</p>	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 56 OF 75

B-57

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N

OR

NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING EQPT REQTS (F4)	
285-4	<p><u>I. Description of Maintenance Function</u></p> <p>There is a requirement to replace a faulty SSCV Actuator that has been removed from the Engine with a serviceable unit.</p> <p>There is a requirement to obtain a serviceable module from spares inventory and transfer it to the Engine.</p> <p>There is a requirement to unpack the spare SSCV Actuator, determine that it is a serviceable unit, and prepare it for installation on the Engine.</p> <p>A requirement exists to protect the faulty actuator per Line Item 284-6, prepare it for shipment, and transport it to WANL facility for disposition.</p> <p><u>II. End Item Design Characteristics</u></p> <p>A. Maintainability N/A</p> <p>B. Functional The requirement exists for the replacement module to be functionally interchangeable with the faulty module.</p> <p>C. Physical The requirement exists to verify that the replacement module is properly identified, that it is a qualified replacement module, and that it is physically interchangeable with the faulty module that has been removed.</p> <p><u>III. Support System Requirements</u> N/A</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 57 OF 75

B-58

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
236-7	<p>I. <u>Description of Maintenance Function</u> A requirement exists to visually inspect the replacement SSCV Actuator module prior to its installation on the Engine.</p> <p>II. <u>End Item Design Characteristics</u> Reference RAS 5.3, Line Item 281-7, Design Requirements, Section II, SSCV Actuator.</p> <p>III. <u>Support System Requirements</u> Reference RAS 5.3, Line Item 281-7, Design Requirements, Section III, SSCV Actuator.</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 58 OF 75

B-59

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N

OR

NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
287-1	<p>I. <u>Description of Maintenance Function</u> The requirement exists to functionally check the replacement SSCV Actuator before installation on the Engine.</p> <p>II. <u>End Item Design Characteristics</u> N/A</p> <p>III. <u>Support System Requirements</u> A means of performing functional tests on a replacement SSCV Actuator prior to its installation in the Engine is required.</p>			<p>I. <u>Environment</u> Reference RAS 5.3, Line Item 201-7, Facilities Requirements, Section I, CDDA Actuator.</p> <p>II. <u>Utilities</u> Reference RAS 5.3, Line Item 201-7, Facility Requirements, Section II, CDDA Actuator.</p> <p>III. <u>Civil/Structural/Architectural</u> A clean room is required in the facility with an area ____ ft. x ____ ft. x ____ ft.</p> <p>IV. <u>Equipment</u> A bench test stand equipped to functionally check the SSCV Actuator must be provided.</p>					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 59 OF 75

B-60

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
288-8	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to clean the SSCV Actuator mounting surfaces to remove any corrosion or contamination that may contribute to a malfunction or impede the performance of maintenance.</p> <p>The cleaning process shall follow the procedures specified in <u>TBD</u>.</p> <p>The surfaces shall meet the standards for cleanliness specified in <u>TBD</u>.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>Maintainability</p> <p>The Engine design shall permit access to the SSCV Actuator mounting surfaces for the purpose of cleaning them.</p> <p>B. Functional N/A</p> <p>C. Physical N/A</p> <p>D. Interfaces N/A</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements, Section III, CDDA Actuator.</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 60 OF 75

B-61

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N

OR

NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
289-3	<p>I. <u>Description of Maintenance Function</u></p> <p>A. A requirement exists to install a replacement SSCV Actuator on the Engine whenever a faulty unit is removed.</p> <p>B. There is also a requirement to attach the electrical connector of the wiring harness to the SSCV actuator.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>Reference RAS 5.3, Line Item 282-3, Design Requirements Section II, SSCV Actuator.</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Design Requirements Section III, Line Item 201-7, CDDA Actuator.</p>		<p>Hand mirror</p> <p>Ratchet type socket wrench</p> <p>Torque wrench</p> <p>Small mallet</p>	<p>Reference RAS 5.3, Line Item 201-7, CDDA Actuator.</p>					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 61 OF 75

B-62

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENTS (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
290-7	<p><u>I. Description of Maintenance Function</u></p> <p>The requirement exists to inspect the SSCV Actuator after it is installed to verify the completion of the repair and the quality of workmanship. The inspection will assure the following.</p> <ol style="list-style-type: none"> 1. Proper mounting of the SSCV Actuator and its attachment devices. 2. Security of the SSCV Actuator on the Engine. 3. Proper torquing of mechanical fasteners and installation of locking devices for the fasteners if applicable. 4. Agreement with contamination and corrosion control specifications. <p><u>II. End Item Design Characteristics</u></p> <p>Reference RAS 5.3, Line Item 281-7, Design Requirements Section II, SSCV Actuator.</p> <p><u>III. Support System Requirements</u></p> <p>Reference RAS 5.3, Design Requirements Section III, Line Item 201-7, CDDA Actuator.</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 62 OF 75

B-63

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 5.3 Assemble and Checkout S-N
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
291-1	<p>I. <u>Description of Maintenance Function</u></p> <p>A requirement exists to perform a checkout of the SSCV Actuator after it is installed.</p> <p>An electrical continuity check will be made to verify the integrity of the electrical connections.</p> <p>A functional check of the installed SSCV Actuator and its associated valve will be performed to verify the capability of running the actuator through the reactor control system.</p> <p>II. <u>End Item Design Characteristics</u></p> <p>Reference RAS 5.3, Line Item 281-7, Design Requirements Section II, SSCV Actuator.</p> <p>III. <u>Support System Requirements</u></p> <p>Reference RAS 5.3, Line Item 201-7, Design Requirements Section III, CDDA Actuator.</p>			Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 63 OF 75

END ITEM MAINTENANCE SHEET

REFERENCE FUNCTION NAME AND NUMBER 4.2 More S-N to 5-11				INSTL STATUS (f)			MAINTENANCE FUNCTIONS (g)												MAINTENANCE LOCATION (h)										AGE ITEM NO. (j)	PROVISIONING DATA (k)					
(a) LINE ITEM	(b) ITEM CONTROL NO.	(c) INDENTURE	(d) SUBSYSTEM END ITEM MANUFACTURERS PART NO. AND NOMENCLATURE	(e) SERIAL NO EFFECTIVITY	1	2	3	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	1	2	3	4	5	6
					SUBSYSTEM ASSEMBLED	SUBSYSTEM DISASSEMBLED	TEST OR CHECKOUT	CALIBRATE - ADJUST	REMOVE - INSTALL	REPLACE	REPAIR - OVERHAUL	PROTECT - SERVICE	VISUAL CHECK / INSPECT	CLEAN - PURGE	SYSTEM ALIGN	STORE - HANDLE	MONITOR - OPERATE	OTHER	WANT	ANSC	OTHER	PROPELLANT DEPOT	LAUNCH PAD	VEHICLE RECOVERY	ACCEPTANCE SITE	ASSEMBLY SITE	TEST STAND	OTHER	OTHER	OTHER	OTHER	OTHER	OTHER		
			SSCV Actuator	ALL	X								V																						
281						X																													
282						X		R																											
283						X										H																			
284						X						P																							
285						X			R																										
286						X							V																						
287						X	T																												
288						X									C																				
289						X		I																											
290						X																													
291						X																													

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO _____

PAGE 6 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S11
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC-677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQUIP REQTS (F4)	
281-7	Design Requirements are identical to those described in RAS 5.3, Line Item 281-7, SSCV Actuator.		Reference RAS 5.3, Line Item 201-7, CDDA Actuator	Reference RAS 5.3 Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 65 OF 75

B-66

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11 OR
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC-677576 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
282-3	Design Requirements are identical to those described in RAS 5.3, Line Item 282-3, SSCV Actuator.		Reference RAS 5.3, Line Item 282-3, SSCV Actuator	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 66 OF 75

B-67

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11 OR
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC-677576 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
283-10	Design Requirements are identical to those shown on RAS 5.3, Line Item 283-10, SSCV Actuator.		Reference RAS 5.3, Line Item 283-10, SSCV Actuator	Reference RAS 5.3, Line Item 201-7, CDDA Actuator.					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 67 OF 75

B-68

REQUIREMENTS ALLOCATION SHEET

OPTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11 OR
 ENCLATURE AND NUMBER OF CEI SSCV Actuator - EC 677576 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PHOCELRAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
284-6	Design Requirements are identical to those shown on RAS 5.3, Line Item 284-6, SSCV Actuator		Reference RAS 5.3, Line Item 284-6, SSCV Actuator	Reference RAS 5.3 Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 68 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11 OR
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC-677576 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
285-4	Design Requirements are identical to those shown on RAS 5.3, Line Item 285-4, SSCV Actuator			Reference RAS 5.3, Line Item 201-7 CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 69 OF 75

B-70

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC-677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENTS (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
286-7	Design Requirements identical to those shown on RAS 5.3, Line Item 286-7, SSCV Actuator			Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 70 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 More S-N to S-11 OR
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC-677576 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
287-1	Design Requirements are identical to those shown in RAS 5.3, Line Item 287-1, SSCV Actuator.			Reference RAS 5.3, Line Item 287-1, SSCV Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 71 OF 75

B-72

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC-677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
288-8	Design Requirements are identical to those shown on RAS 5.3, Line Item 288-8, SSCV Actuator			Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 72 OF 75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - LC-677576

OR
(A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
289-3	Design Requirements are identical to those shown on RAS 5.3, Line Item 289-3, SSCV Actuator		Reference RAS 5.3, Line Item 289-3, SSCV Actuator	Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 73 OF 75

B-74

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11 OR
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC-677576 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E) NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
					TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
290-7	Design Requirements are identical to those in RAS 5.3, Line Item 290-7, SSCV Actuator			Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 74 OF 75

B-75

REQUIREMENTS ALLOCATION SHEET

FUNCTIONAL DIAGRAM TITLE AND NUMBER 4.2 Mate S-N to S-11 OR
 NOMENCLATURE AND NUMBER OF CEI SSCV Actuator - EC677576 (A)

FUNCTION NAME AND NUMBER (B)	DESIGN REQUIREMENTS (C)	REFERENCE OR TRADE AND DESIGN STUDY NO. (H)	EQUIPMENT IDENTIFICATION (E)	FACILITY REQUIREMENTS (D)	PERSONNEL AND TRAINING EQUIPMENT REQUIREMENT (F)				PROCEDURAL DATA REQTS (G)
			NOMENCLATURE AND CEI, ECC OR DETAIL SPEC OR INDEX NO.		TASKS (F1)	TIME REQD (F2)	PERFORMANCE REQTS (F3)	TRAINING AND TRAINING EQPT REQTS (F4)	
291-1	Design Requirements are identical to those in RAS 5.3, Line Item 291-1, SSCV Actuator			Reference RAS 5.3, Line Item 201-7, CDDA Actuator					

REVISION _____ DATE _____ APPROVAL _____ DOCUMENT NO. _____ PAGE NO. 75 OF 75

TITLE Maintainability Allocations, Assessments and Analysis Report	
	DOCUMENT NO. WANL-TME-2766	DATE December 1970
ABSTRACT This document presents the Maintainability features of the Nuclear Subsystem of the NERVA engine. It provides an evaluation of the current and potential maintainability of the NSS for meeting the specified requirements.		
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