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ENGINEERING DATA TRANSMITTAL

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# LDUA SOFTWARE CUSTODIAN'S NOTEBOOK

B. L. Aftanas  
COGEMA Engineering Corp., Richland, WA 99352  
U.S. Department of Energy Contract DE-AC06-96RL13200

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Abstract: This notebook records the software change requests and problem reports for the Light Duty Utility Arm robotic manipulation arm control software up to and including revision 1.0.7.

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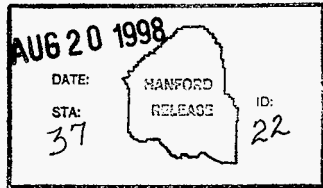
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# LDUA

## Software Custodian's Notebook

LDUA-SCN-97-001

# LDUA

## Software Custodian's Notebook

1.	Software Configuration Management Plan .....	1-1
2.	Software Configuration Procedures .....	2-1
3.	SDAS User Interface .....	3-1
4.	SDAS Server & Drivers .....	4-1
5.	Spar LDUA Console .....	5-1
6.	LDUA Position Client/Server .....	6-1
7.	World Model .....	7-1
8.	Software Change Notification Contact List .....	8-1
9.	LDUA Software Change Request/Problem Report Log .....	9-1

# Software Configuration Management Plan

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Page 1 of 1  
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7. Abstract This plan describes the activities to be performed and controls to be applied to the process of specifying, obtaining, and qualifying the control and data acquisition software for the LDUA System. It serves the purpose of a software quality assurance plan, a verification and validation plan, and a configuration management plan.	<p><b>APPROVED FOR PUBLIC RELEASE</b></p> <p><i>Quality Assurance 10/20/93</i></p>	
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## WHC-SD-TD-SDP-001, Rev. 0

## LIGHT DUTY UTILITY ARM SOFTWARE DEVELOPMENT PLAN

## TABLE OF CONTENTS

1.0 PURPOSE . . . . .	1
2.0 SCOPE . . . . .	1
3.0 INTRODUCTION . . . . .	1
3.1 DESCRIPTION OF LDUA AND ITS MISSION . . . . .	1
3.2 QUALITY GOALS . . . . .	2
3.3 DESCRIPTION OF THE DEVELOPMENT PROCESS . . . . .	3
3.3.1 CONCEPT . . . . .	3
3.3.2 REQUIREMENTS . . . . .	3
3.3.3 DESIGN . . . . .	3
3.3.4 IMPLEMENTATION . . . . .	4
3.3.5 TESTING . . . . .	5
4.0 TERMINOLOGY . . . . .	5
4.1 ACRONYMS . . . . .	5
4.2 DEFINITIONS . . . . .	6
5.0 LDUA SOFTWARE LIFE CYCLE . . . . .	6
5.1 DESCRIPTION OF LIFE CYCLE . . . . .	7
5.2 CATEGORIES OF SOFTWARE . . . . .	7
5.3 LIFE CYCLE ACTIVITIES . . . . .	9
5.4 LIFE CYCLE DELIVERABLES . . . . .	10
5.5 VERIFICATION AND VALIDATION (V&V) . . . . .	11
5.6 SCHEDULING THE LDUA LIFE CYCLE . . . . .	12
6.0 DELIVERABLES . . . . .	12
6.1 COMPUTER SOFTWARE REQUIREMENTS SPECIFICATION (CSRS) . . . . .	12
6.2 COMPUTER SOFTWARE DESIGN DESCRIPTION (CSDD) . . . . .	13
6.3 USER DOCUMENTS . . . . .	13
6.4 SOFTWARE TESTING DOCUMENTS . . . . .	14
6.5 USER TRAINING . . . . .	15
6.6 COMPUTER SOFTWARE . . . . .	15
6.7 VERIFICATION AND VALIDATION (V&V) REPORT . . . . .	15
6.8 VERIFICATION AND VALIDATION (V&V) RECORDS . . . . .	15
7.0 VERIFICATION AND VALIDATION . . . . .	16
7.1 VERIFICATION METHODS . . . . .	16
7.1.1 INDEPENDENT REVIEWS . . . . .	16
7.1.2 CODE EVALUATION . . . . .	17
7.1.3 PROTOTYPE SOFTWARE . . . . .	17
7.1.4 SOFTWARE COMPONENT TESTING . . . . .	18
7.2 VALIDATION TESTING . . . . .	18

## WHC-SD-TD-SDP-001, Rev 0

7.2.1 SOFTWARE VALIDATION TESTING . . . . .	18
7.2.2 TEST CASE PREPARATION . . . . .	18
8.0 RESPONSIBILITIES . . . . .	19
9.0 CONFIGURATION MANAGEMENT . . . . .	20
9.1 CONFIGURATION CONTROL OF DOCUMENTS . . . . .	20
9.2 CONFIGURATION CONTROL OF SOFTWARE . . . . .	21
9.2.1 IDENTIFICATION OF SOFTWARE . . . . .	21
9.2.2 PHYSICAL CONTROL OF SOFTWARE . . . . .	21
9.2.3 SOFTWARE CUSTODIAN . . . . .	22
9.2.4 RELEASE AND CHANGE CONTROL OF SOFTWARE . . . . .	22
9.2.5 PROBLEM REPORTING AND CORRECTIVE ACTION . . . . .	23
9.2.6 PHYSICAL MEDIA CONTROL . . . . .	24
9.2.7 CONFIGURATION STATUS ACCOUNTING AND REPORTING . . . . .	25
10.0 IMPACT LEVELS AND APPROVALS . . . . .	25
11.0 REFERENCES . . . . .	27

WHC-SD-TD-SDP-001, Rev 0

## LIGHT DUTY UTILITY ARM SOFTWARE DEVELOPMENT PLAN

### 1.0 PURPOSE

This plan describes the activities to be performed and controls to be applied to the process of specifying, obtaining, and qualifying the control and data acquisition software for the Light Duty Utility Arm (LDUA) System. It serves the purpose of a software quality assurance plan, a verification and validation plan, and a configuration management plan.

### 2.0 SCOPE

This plan applies to all software that is an integral part of the LDUA control and data acquisition system, that is, software that is installed in the computers that are part of the LDUA system as it is deployed in the field. This plan applies to the entire development process, including: requirements; design; implementation; and operations and maintenance. This plan does not apply to any software that is not integral with the LDUA system.

This plan has been prepared in accordance with WHC-CM-6-1 "Engineering Practices", EP-2.1 (Ref. 2), WHC-CM-3-10 "Software Practices" (Ref. 3), and WHC-CM-4-2, QR 19.0, "Software Quality Assurance Requirements" (Ref 1).

### 3.0 INTRODUCTION

#### 3.1 DESCRIPTION OF LDUA AND ITS MISSION

The mission of the LDUA is to perform surveillance and characterization operations in support of the U.S. Department of Energy (DOE) goal of remediation of defense nuclear wastes currently stored in Hanford Underground Storage Tanks (USTs).

The LDUA has a multi-axis robotic arm with a 2.74 meter (nine foot) reach and 22.7 kilogram (fifty pound) payload that is mounted on the end of a 13.7 meter (forty-five foot) positioning mast. It is designed to enter an UST through an available 30.5 centimeter (twelve inch) riser. A deployment vehicle carries the positioning equipment to insert the mast and arm into the

## WHC-SD-TD-SDP-001, Rev 0

riser, and a containment enclosure to control contamination when the arm is in the tank or being transported from tank to tank. Interchangeable end effectors are mounted one at a time on the end of the arm. These end effectors provide a wide range of observation and measurement functions such as photographic and video inspection and recording, detailed surface mapping of the tank and surface of the waste, in-situ chemical analysis of the waste, and so forth. A control and data acquisition system provides both stand-alone operation of subsystems and a supervisory level of control for integrated operations.

The LDUA System will be implemented in successive stages, or missions: Mission one is mostly concerned with surveillance activities; mission two is involved with in-situ analysis of the waste; and mission three is concerned with depth penetration of the waste with possible small scale retrieval of samples.

The LDUA system is being implemented by a consortium DOE contractors from several DOE sites and National Laboratories. These contractors are individually funded by and responsible to the DOE Office of Technology Development (OTD) through multiple Technical Task Plans (TTPs). These TTPs interlock and effectively establish a cooperative arrangement with Westinghouse Hanford Company (WHC) as the lead site responsible for coordination of the effort, for taking ownership of the completed system, and for assuring that it is qualified for deployment into Hanford USTs. The LDUA system is divided into several subsystems; generally speaking, each contractor is responsible for one or more subsystems. Commercial companies are also involved as third party participants under direct contractual relationships with one or more of the DOE contractors.

### 3.2 QUALITY GOALS

An important goal of the finished LDUA system is to demonstrate advanced robotic technology that can be of benefit to the tank waste remediation effort. This technology is emerging from a research and development effort by OTD and is ready to become commercially supported; the LDUA will provide the pilot system to encourage and stimulate this commercial development.

However, the LDUA system must be fully qualified to deploy into underground storage tanks and function as an operational system; no compromise in safety, reliability, or maintainability can be made for the sake of the technology demonstration. The system must be capable of being operated by Hanford operations personnel. The system must also be flexible and expandable in order to accommodate lessons learned from actual tank deployment, and to support new surveillance and characterization end effectors.

These goals have been used as the basis for choosing the quality assurance provisions of this plan.

## WHC-SD-TD-SDP-001, Rev 0

### 3.3 DESCRIPTION OF THE DEVELOPMENT PROCESS

#### 3.3.1 Concept

The concept for the LDUA and its control system has evolved through previous work within OTD within the Robotics Technology Development Program (RTDP) and the Underground Storage Tank - Integrated Demonstration (UST-ID) program. The control system concept has been reviewed for suitability to LDUA by means of a Value Engineering session. Functional requirements for the LDUA system have been further refined by a series of meetings with the tank farm operations organizations (notably, Tank Surveillance Technology). A functions and requirements document is being prepared for the LDUA system which includes requirements for the control and data acquisition system.

#### 3.3.2 Requirements

From the LDUA system functions and requirements, a Computer Software Requirements Specification (CSRS) document shall be produced by WHC. The CSRS is a detailed specification for the LDUA software. There shall be a single CSRS for the LDUA and it shall apply to the integrated system, but it shall be organized by subsystem. It shall be verified by a review that is co-incident with, or related to, the LDUA system Conceptual Design Review. The LDUA software shall be validated against the CSRS by means of formal validation testing at the end of the development process.

Certain features of the system, such as the human-machine interface (HMI), may be prototyped during this process to help establish requirements.

#### 3.3.3 Design

Next, the design process shall break the LDUA software into its software components. The functional specification and interfaces for these components shall be defined, and the method of implementation shall be selected. Software components shall be classified into pre-defined categories that are based primarily on the method of implementation. The responsibility for producing each of the software components shall rest with the software component supplier, which will be a member of the DOE consortium or a commercial vendor under contract to such a member.

A Computer Software Design Description (CSDD) shall be prepared by WHC. Certain software component suppliers may be called upon for technical aid in this effort. The CSDD shall describe the integrated LDUA software in terms of its breakdown into the software components and their interfaces. It shall be verified at a preliminary stage of completion by a review that is related to the LDUA system 25% design review, and verified at completion by a review

## WHC-SD-TD-SDP-001, Rev 0

that is related to the LDUA system 80% design review. User documents shall be also be reviewed at this point in draft form.

Software components in certain categories may require further design effort by the supplier, which shall break the component down into its constituent modules. Such designs shall be appended to the CSDD. Verification of these designs shall be done by a review on a per-component basis.

Certain features of a software component, such as the human-machine interface (HMI), may be prototyped during this process to help establish design details.

### 3.3.4 Implementation

After the design is approved, each software component shall be implemented by the supplier according to its category. The supplier may purchase commercial software, modify existing RTDP software, or program new software. Newly created software and existing RTDP software shall be required to comply with coding and documentation standards; this may require that modifications be made to the existing RTDP software.

WHC shall produce an overall Software Operation Manual that applies to the integrated system. Software component suppliers shall provide appropriate technical reference documents according to the category of the software component and the nature of the end user. For example, software components that are only seen by a programmer would have an application program interface (API) description, whereas those that had an interface with an operator would have an operating manual. A software maintenance manual must be provided for any software components that become the responsibility of WHC to maintain after delivery, or that have the potential to become the responsibility of WHC.

An implementation review shall be conducted to verify that finished software component meets its design requirements, that it complies with applicable coding standards, and the required documentation is available and acceptable. Some categories of software component shall also have component testing performed prior to the review. This would be accomplished by execution of a test suite provided by the software component supplier. WHC may perform code evaluations on key modules within software components at any time during the implementation of the software component.

WHC shall produce the Testing Documents, which shall be used for validation testing of the finished LDUA software. For certain categories, software component suppliers shall provide test cases applicable to their software.

## WHC-SD-TD-SDP-001, Rev 0

## 3.3.5 Testing

After implementation is complete, the software components shall be integrated into the LDUA system which will be set up in the cold test facility at WHC, and validation testing shall then be done according to the procedures and provisions described in the Testing Documents. When testing is complete, all of the verification records (results of various reviews, evaluations, and component tests) and the validation records (results of the validation testing) shall be collected and issued by WHC, and a Verification and Validation Report (V&V Report) shall be prepared by WHC. A review shall be held to evaluate the records and the report.

A software component shall be placed under WHC configuration management upon acceptance for integration. The supplier must furnish a software component in a format compatible with WHC configuration management. Change control shall be under the authority of the WHC cognizant engineer during integration, but the supplier shall be responsible for performing any modifications to the code. Turnover of a software component from the supplier to WHC shall occur when all software components have been successfully integrated into the LDUA system. Change control shall transfer to WHC Document Control according to WHC standard engineering practices when validation testing begins.

The CSRS, CSDD, Testing Documents, Software Operation Manual, and V&V Report shall be the responsibility of WHC and shall be released and controlled according to WHC standard engineering practices for supporting documents. Technical reference manuals shall be the responsibility of the software component supplier and shall be maintained in the LDUA project file. All other documentation shall be entered into the LDUA project file.

## 4.0 TERMINOLOGY

## 4.1 ACRONYMS

API	Application Program Interface
CDR	Conceptual Design Review
CSDD	Computer Software Design Description
CSRS	Computer Software Requirements Specification
DDR	Detail Design Review
DOE	U.S. Department of Energy

## WHC-SD-TD-SDP-001, Rev 0

ECN	Engineering Change Notice
EDT	Engineering Data Transmittal
GUI	Graphic User Interface
HMI	Human-Machine Interface
LDUA	Light Duty Utility Arm System
OTD	DOE Office of Technology Development
PDR	Preliminary Design Review
RTDP	Robotics Technology Development Program
UST-ID	Underground Storage Tank - Integrated Demonstration Program
UST	Hanford Underground Storage Tank
V&V	Verification and Validation
WHC	Westinghouse Hanford Co.

## 4.2 DEFINITIONS

Computer Software Media. Is the different kinds of tapes, discs, etc. used by the computer for storing and retrieving software (Ref. 2).

Computer Software. Computer programs, procedures, and possibly associated documentation and data pertaining to the operation of a computer system. (IEEE Std. 729-1983, Ref. 7).

Configuration Management. The process of identifying and defining the configuration items in a system, controlling the release and change of these items throughout the system life cycle, recording and reporting the status of configuration items and change requests, and verifying the completeness and correctness of configuration items (IEEE Std. 729-1983, Ref. 7).

Software Life Cycle. The period of time that starts when a software product is conceived and ends when the product is no longer available for use (IEEE Std. 729-1983, Ref. 7).

Validation. The process of evaluating software at the end of the software development process to ensure compliance with software requirements (IEEE Std. 729-1983, Ref. 7).



## WHC-SD-TD-SDP-001, Rev 0

Verification. The process of determining whether or not the products of a given phase of the software life cycle fulfill the requirements established during the previous phase. The act of reviewing, inspecting, testing, checking, auditing, or otherwise establishing and documenting whether or not items, processes, services, or documents conform to specified requirements (IEEE Std. 729-1983, Ref. 7).

## 5.0 LDUA SOFTWARE LIFE CYCLE

## 5.1 DESCRIPTION OF LIFE CYCLE

The development process described in section 3.3 is based on a software life cycle model. As suggested in section 3.3, the LDUA life cycle model consists of the following 5 phases:

- Requirements Phase
- Design Phase
- Implementation Phase
- Testing Phase
- Operation and Maintenance Phase

This software life cycle is based upon WHC-CM-3-10, SP 1.1 (Ref. 3) and IEEE Software Engineering Standard 1012-1986, "IEEE Standard for Software Verification and Validation Plans".

## 5.2 CATEGORIES OF SOFTWARE

Categories have been established for software components. The categories depend mostly on the method of obtaining the software component.

- A. Standard Commercial: This category of software is available off the shelf in the open market and is fully supported by the vendor.
- B. Special Commercial: This category of software is supplied by a commercial vendor, but it is either not an off-the-shelf product or is not supported by the vendor.
- C. Existing RTDP: This is software which has been developed under the RTDP; it typically embodies technology not yet available in marketplace, but which has been judged to be essential to LDUA.

## WHC-SD-TD-SDP-001, Rev 0

- D. Application Specific: This is software which will be developed new by WHC or one of the other DOE contractors in the consortium.

The provisions of this plan apply differently to software in each of the categories. Such differences are noted throughout the plan.

WHC-SD-TD-SDP-001, Rev 0

## 5.3 LIFE CYCLE ACTIVITIES

PHASE	ACTIVITIES
Requirements	Establishes detailed requirements for the integrated software from the LDU A system function and requirements. An outline test plan shall be produced at the same time as the CSRS in order to help assess the testability of the CSRS.
Design	Translates the detailed requirements into a computer software design description, which is a description the integrated software that shows its breakdown into software components and describes their function and interfaces. Additional design work may be done for some categories of software components that shall break them down into their constituent modules.
Implementation	Produces working software components from the design description. The method of implementation depends on the software component category (see section 5.2).
Testing	Integrates software components into the LDU A system in the cold test facility. Software is placed under WHC configuration management at beginning of Testing Phase. During the integration period, change control is under control of LDU A Control System Cognizant Engineer.
	Turnover from supplier to WHC occurs at the transition from integration to formal testing.
	Validates the software by formal testing of the complete system according to validation testing procedures. Change control is under WHC Document Control procedures at this point.
Operations and Maintenance	Uses software for its intended purpose. Residual errors are removed and enhancements may be added during the useful life of the software. Ownership of the LDU A system is transferred from engineering to operations.

## WHC-SD-TD-SDP-001, Rev 0

## 5.4 LIFE CYCLE DELIVERABLES

PHASE	DELIVERABLES	RESP. <sup>1</sup>	SECTION
Requirements	Computer Software Requirements Spec.	WHC	6.1
	Software Testing Documents: - Software Test Plan (outline)	WHC	6.4
Design	Computer Software Design Description - Contributions by supplier - SW Component Design Description	WHC B,C,D B,C,D	6.2
	User Documents (draft) - Software Operation Manual - Technical Reference Documents <sup>2</sup>	WHC A,B,C,D	6.3
	Software Testing Documents: - Software Test Plan (draft) - Software Test procedures (outline) - Software Test Specifications (draft)	WHC	6.4
Implementation	User Documents - Software Operation Manual - Technical Reference Documents <sup>2</sup>	WHC A,B,C,D	6.3
	Computer Software	A,B,C,D	6.6
	Software Component Test Suite	B,C,D	6.6
	Software Testing Documents: - Software Test Plan - Software Test procedures - Software Test Specifications	WHC	6.4
	User Training	(all)	6.5
Testing	Verification and Validation Report	WHC	6.7
	Verification and Validation Records	(all)	6.8
Operations and Maintenance	(modifications repeat the same process as above and will generate the same deliverables, as appropriate)		X

<sup>1</sup> Responsibility for deliverable is denoted as follows:

WHC = Westinghouse Hanford;

A, B, C, or D = Supplier of the software component (refer to section 5.2).

<sup>2</sup> Technical Reference Documents may include:

- Operating Manual for software component
- API description

## WHC-SD-TD-SDP-001, Rev 0

- Software Maintenance Manual  
 5.5 VERIFICATION AND VALIDATION (V&V)

PHASE	VERIFICATION AND VALIDATION ACTIVITY	RESP <sup>1</sup>	SECTION
Requirements	Software Requirements Review	WHC	7.1.1
	Prototype Software (optional)	D	7.1.3
Design	Software Design Review	WHC	7.1.2
	Prototype Software (optional)	D	7.1.3
Implementation	Preparation of Test Cases	WHC	7.2.2
	Software Implementation Review	WHC	7.1.1
	Software Component Testing	B,C,D	7.1.4
	Code Evaluation (optional)	WHC	7.1.2
Testing	Validation Testing	WHC	7.2.1
	Verification & Validation Review	WHC	7.1.1
Operations and Maintenance	(any of the above, as appropriate)		

NOTE: Each of these activities shall be documented. The accumulated set of these documents plus the Verification and Validation Report shall constitute the V&V Records (refer to Section 6.8)

<sup>1</sup> Responsibility for activity is denoted as follows:

WHC = Westinghouse Hanford;

A, B, C, or D = Supplier of the software component (refer to section 5.2).

WHC-SD-TD-SDP-001, Rev 0

## 5.6 SCHEDULING THE LDUA LIFE CYCLE

A project schedule has been established for the LDUA system. The software activities and deliverables specified in this plan shall be synchronized to the key milestones in that schedule according to the guidelines given below:

PHASE	RELATED LDUA SYSTEM MILESTONE
Requirements	The Requirements Review shall coincide with the LDUA Conceptual Design Review (CDR). This will end the Requirements Phase.
Design	A preliminary level of the CSDD shall be reviewed at the LDUA 20% Detail Design Review (PDR).
	The Design Review of the finished CSDD shall coincide with the LDUA 80% Detail Design Review (DDR). Design reviews of individual software components may occur subsequent to DDR.
Implementation	The Implementation Phase will end when the software is accepted for integration into the LDUA system at the beginning of LDUA cold test.
Testing	The Testing Phase will exactly overlap LDUA cold testing.
Operations and Maintenance	The Operations and Maintenance Phase will begin when LDUA cold testing is finished and the LDUA system has been accepted by tank farm operations.

## 6.0 DELIVERABLES

### 6.1 COMPUTER SOFTWARE REQUIREMENTS SPECIFICATION (CSRS)

The CSRS is a complete and exact description of the functions that the software is expected to perform. It shall be the basis of both design and validation testing and it shall derive from the LDUA system functions and requirements.

There shall be one CSRS for the LDUA software which shall apply to the integrated system. It shall be structured so that each subsystem is sufficiently independent to facilitate selective design, implementation, and testing to accommodate the phased LDUA missions (see discussion in section 3.1).

## WHC-SD-TD-SDP-001, Rev 0

## 6.2 COMPUTER SOFTWARE DESIGN DESCRIPTION (CSDD)

The CSDD shall describe the design of the LDUA software in terms of its decomposition into software components. It shall describe the functions of individual software components and the interfaces between them. There shall be a single CSDD and it shall address the LDUA software as an integrated system. Its primary purpose shall be to assure that each software component is well enough defined so that its supplier can produce it with high confidence of success, and that it will integrate into the finished system, and that the resulting integrated system will meet the functional requirements.

A typical decomposition is hierarchical and begins at the top level by showing the execution units (processes, tasks, programs, etc.) and their intercommunication. The subsequent levels of decomposition break each process into modules (subprograms, functions, objects, etc). Structure Charts (Ref. 6) are one appropriate decomposition format for traditional procedural languages such as C. Alternate or additional decomposition strategies (such as object class hierarchies) can be used where they are more appropriate. The LDUA Control System Cognizant Engineer (see section 8.0) shall approve the methods used.

Certain software components, notably those in category D (Application Specific), may need to be further decomposed to some level. The decomposition need not go down to the most detailed levels, but only needs to establish a correct fundamental structure for the code so that it will not have to be significantly re-structured during the coding phase. The required level of decomposition of the design of each software component shall be recommended by the Lead Software engineer and shall be approved by the LDUA Control System Cognizant Engineer (see section 8.0).

## 6.3 USER DOCUMENTS

The Software Operation Manual describes how to use the integrated LDUA software for its intended purpose, and how to recover from operational errors. There shall be a single such manual for the LDUA. It shall be prepared in draft form during the Design Phase and shall be completed during the Implementation Phase to a degree that facilitates integration and validation testing of the software. It is expected that some revision may take place during the Testing Phase.

This document shall have a section organized according to the normal tasks a user would perform with the system, a section organized as a reference for menus and displays, and a section organized as a tutorial for inexperienced users. During the Design Phase, the reference section would be the most complete, and the other sections would be sketchy. Since the supervisory control system will be based on a graphic user interface (GUI)

## WHC-SD-TD-SDP-001, Rev 0

with pull-down or pop-up menus and dialogue boxes, it is expected that the reference section will consist mostly of pictures of display windows (screen dumps) with accompanying descriptions.

The suppliers of software components shall be responsible for providing one or more Technical Reference Documents for each software component. These documents will vary according to the category of the software component and according to the nature of its user.

- An Operating Manual shall be supplied with the software component if it has an interface with an operator.
- An Application Program Interface (API) Description shall be supplied with the software component if it has an interface that a programmer would be expected to use.
- All software components in categories C (Existing RTDP) and D (Application Specific), and maybe some in category B (Special Commercial), shall be supplied with a Software Maintenance Manual. This document shall include whatever is necessary to enable WHC software support staff to isolate and correct mistakes in the software component. It may include items such as program listings, structural diagrams, explanatory text, and so forth.

The standard user documentation provided by the vendor will be acceptable for category A (Standard Commercial) software components. For category B (Special Commercial) software components it shall be desirable to obtain as many items from the list as possible, subject to the vendor's ability to provide them and the procurement contract with the vendor.

All Technical Reference Documents to be supplied must be available at least in draft form during the Design Review, and must be completed during the Implementation Phase.

#### 6.4 SOFTWARE TESTING DOCUMENTS

The complete set of Software testing documents consists of a test plan, test procedures, and test specifications, as defined by EP-4.2 (Ref 2). For the Requirements Phase, only the outline of the test plan is required in draft form in order to help assess the testability of the CSRS. For the Design Phase, the full set of Software Testing Documents is produced, but in a preliminary and incomplete form which only need support the software implementation effort: Software Test Plan (draft); Software Test procedures (outline); Software Test Specifications (draft). For the Testing phase, the full set of Software Testing Documents is completed. These documents shall include or reference the test cases prepared with the code.



## WHC-SD-TD-SDP-001, Rev 0

**6.5 USER TRAINING**

Training must be available from the supplier of each software component for WHC technical staff before the Testing Phase begins. LDUA Control System Cognizant Engineer (see section 8.0) may waive the requirement for training by the supplier for software components where the Technical Reference Documents are sufficient. WHC technical staff shall subsequently train operations organizations.

**6.6 COMPUTER SOFTWARE**

Computer software includes computer codes, command files, configuration description files, and data directly related to the operation of computer systems. It includes source, object, and executable formats, and data in its multiple forms such as binary and text files, and database tables. Software shall conform to LDUA software coding standards (to be established by the LDUA Control System Cognizant Engineer (see section 8.0) in a future document). It shall be turned over to WHC from the supplier in such a form that it can be placed under configuration management as described in section 9.0.

**6.7 VERIFICATION AND VALIDATION (V&V) REPORT**

The Verification and Validation Report summarizes all the V&V activities which have been performed upon all the software components during the life cycle and explains how the results of these activities prove the acceptability of the LDUA integrated software.

**6.8 VERIFICATION AND VALIDATION (V&V) RECORDS**

Verification and validation records are the collected, documented results of all the V&V activities which have been performed on all the software components. This includes:

- Independent review reports
- Design review completion reports
- Test results and test reports
- Verification and Validation Report.

WHC-SD-TD-SDP-001, Rev 0

## 7.0 VERIFICATION AND VALIDATION

The verification and validation (V&V) provisions of this plan identify and describe those software development activities (summarized in Section 5.5) whose primary purpose is to establish confidence and to provide objective evidence that the software adequately and correctly performs all its required functions and does not have harmful or unacceptable behavior. Verification refers to the process of evaluating the products of a single phase of the life cycle against the inputs to that phase. Validation refers to objectively testing the finished software product against the CSRS. The V&V activities are integrated into the software development process during all phases of the life cycle.

### 7.1 VERIFICATION METHODS

Verification activities shall consist of independent reviews, formal design reviews, code evaluations, and software component testing. Prototype software may be used optionally as an adjunct to these activities at the discretion of the Lead Software Engineer (see section 8.0). Section 5.5, and the detail sections it references, establish the minimum verification activities required, and suggest additional activities which may be performed for individual software components at the discretion of the LDUA Control System Cognizant Engineer.

#### 7.1.1 Independent Reviews

Independent reviews shall be conducted by reviewers who are competent individuals other than those responsible for the design being reviewed. The primary materials reviewed shall be one or more of the deliverables for the life cycle phase in which the review is performed. The function of the review shall be to establish that the reviewed materials adequately satisfy the requirements of the baseline documents which were input to the life cycle phase. A written report of the review will be prepared and comments and action items from the review will be entered into and tracked by the LDUA project comment database.

Independent reviews shall be conducted according to EP-4.1 (Ref 2). All reviews shall be documented as part of the V&V Records. The specific reviews required are:

- Software Requirements Review is conducted at the end of the Requirements Phase to assure that the requirements stated in the CSRS are adequate, technically feasible, and complete, and that they accurately conform to the functions and requirements for the associated LDUA system. The

## WHC-SD-TD-SDP-001, Rev 0

software requirements review is part of the preliminary design review of its LDUA subsystem.

- Software Design Review -- The Software Design Review evaluates the technical adequacy, completeness, and correctness of the detailed design before the start of actual coding. Evaluates the acceptability of the detailed design depicted in the computer software design description, establish that the detailed design satisfies the requirements of the CSRS, and review compatibility with other software and hardware with which the software component is required to interact. There shall be a preliminary design review and a final design review. They shall be coordinated with the LDUA project schedule as noted in section 5.6.
- Software Implementation Review -- The Software Implementation Review is an evaluation of the completed software, user documents, and test documents to determine: 1) Software is complete and satisfies computer software design description or purchase specifications, and is ready to begin integration for validation testing; 2) User documents are complete and correct enough to enable testers to use product in testing; and 3) Testing documents are complete and adequate for Testing Phase to begin. The results of any software component testing (see section 7.1.4) shall also be reviewed.
- V&V Review -- The software verification and validation review is an evaluation of the adequacy of the completed software verification and validation activities and the Verification and Validation Report. It is performed at the end of the Testing Phase.

### 7.1.2 Code Evaluation

Code evaluation is a set of procedures and error-detection techniques for reading of code by a group of people. The two types of code evaluation which may be used for LDUA software are Code Inspections or Code Walkthroughs. These techniques are described in chapter 3 of Myers (Ref. 5). These may be performed on selected modules within a category C (Existing RTDP) or D (Application Specific) software component by WHC at the discretion of the LDUA Control System Cognizant Engineer (see section 8.0).

### 7.1.3 Prototype Software

Prototype software mimics some aspects of the actual software which is being developed. Its purpose is to provide users and other parties affected by the software a chance to acquire some "hands on" experience with the proposed software in order to make informed comment and assure that the requirements and design for the proposed software well and truly address the needs of the application. Prototype software is also useful for assessing the human factors provisions of the human-machine interface (HMI).

## WHC-SD-TD-SDP-001, Rev 0

Prototype software shall be implemented quickly and cheaply; it need not be complete nor durable, nor must it be maintained beyond its initial use. Prototype software need not itself be developed according to this development plan: that is, it need not follow the software life cycle, it need not be formally reviewed, and it need not be released. However, it shall be subject to configuration control (see Section 9).

#### 7.1.4 Software Component Testing

For category B (Special Commercial), C (Existing RTDP), and D (Application Specific) software components, testing occurs at the end of implementation phase to show that a software component meets its design requirements and is ready to integrate for cold test. This testing is accomplished by a test suite of software provided by supplier of the software component. This test suite is not the same as the validation testing described in section 7.2; the test suite is only concerned with the software component, whereas validation testing is concerned with the integrated LDUA software.

### 7.2 VALIDATION TESTING

#### 7.2.1 Software Validation Testing

Software Validation Testing is the process of testing the software to prove that it meets original specifications as defined in the CSRS. Validation testing shall occur during the testing phase of the software life cycle and shall be the key vehicle for bringing the software into commission for operations. The software will be installed into its LDUA system and the complete system will then be tested.

Validation testing shall be planned and conducted in accordance with the provisions of the LDUA test plan (to be established in the future) and EP-4.2 (Ref 2).

Validation Testing shall consist of subjecting the integrated LDUA software to all its test cases (see section 7.2.2); the inputs defined by each test case shall be applied and the responses of the software under test shall be captured and evaluated against the expected results also defined in each test case.

#### 7.2.2 Test Case Preparation

As described in section 7.2.1, validation testing is defined by a set of test cases; each test case contains a set of inputs to be applied to the software, a set of expected results, and a description of the environment in

## WHC-SD-TD-SDP-001, Rev 0

which the test case is to be applied. Test cases for software component shall be developed at the same time that it is being designed and coded, and the preparation is considered part of the verification process. Test cases shall be part of the software testing documents (refer to section 6.4).

Test cases shall be based upon the CSRS. A minimum set of test cases would exercise all the primary functions of the software as defined strictly by its externally specified behavior ("black box" testing). Where the source code to a software component is available, additional test cases can be created based upon the knowledge of the internal structure and details of the code ("white box" testing).

## 8.0 RESPONSIBILITIES

LDUA Control System Cognizant Engineer -- The LDUA Control System Cognizant Engineer shall interpret how this software development plan is applied to the integrated system and to each software component and shall coordinate and approve work of software component suppliers. He or she shall also determine whether a piece of software is integral to the LDUA system and therefore covered by this plan.

Lead Software Engineer -- The Lead Software Engineer shall have responsibility for producing one or more software components, and will typically be a member of the software component supplier's staff. The Lead Software Engineer shall assure that the software component is properly acquired and controlled according to this software development plan according to guidelines established by the LDUA Control System Cognizant Engineer. Specific responsibilities include: helping establish the functional requirements for software; making decisions on design issues; assuring that software developers comply with requirements of this software development plan; preparing documents; allocating and scheduling resources; and assuring that configuration management requirements are followed.

LDUA System Lead -- The LDUA system lead is responsible for overall direction and coordination of the LDUA system project, and shall be responsible for assuring that the software deliverables and schedule are acceptable with respect to the schedule and technical requirements of the LDUA system.

Cognizant Manager -- The Cognizant Manager shall be responsible for assuring that reviews and approvals appropriate to impact level are obtained for software and other configuration items. The WHC Technical Manager who is assigned responsibility for the LDUA shall be considered the Cognizant Manager.

## WHC-SD-TD-SDP-001, Rev 0

Software Custodians -- Software Custodians shall be responsible for the physical custody of the software assigned to them. This shall involve control of access to the software, distribution to users, control of media, and physical protection, and other duties defined in Section 9.0 of this plan. The Software Custodian shall also be the single point of contact for problem reporting.

Quality Assurance -- WHC Quality Assurance is responsible for reviewing and approving software deliverables as noted in Section 10 of this plan.

Safety -- WHC Safety is responsible for reviewing and approving software deliverables as noted in Section 10 of this plan.

## 9.0 CONFIGURATION MANAGEMENT

This section of the plan identifies the items which are defined to be part of the configuration of the software and describes the process for controlling release and change of these configuration items.

Configuration items defined by this plan are the life cycle deliverables described in Section 5.4.

## 9.1 CONFIGURATION CONTROL OF DOCUMENTS

Documents that are defined in section 5.4 to be the responsibility of WHC shall be controlled as Supporting Documents. Other documents shall be the responsibility of the supplier of the software component, and two copies shall be furnished to WHC - one copy shall be maintained in the LDUA project file, the other copy shall be available for field reference. Where possible, the supplier shall provide an electronic copy of the documents to allow future update by WHC.

Supporting Documents shall be issued a supporting document number according to EP-1.1 (Ref 2). They shall be released via an Engineering Data Transmittal (EDT) form according to EP-1.6 (Ref 2). Changes to released supporting documents shall be controlled via an Engineering Change Notice (ECN) according to EP-2.2. (Ref.2)

Supporting Documents shall be released during the software life cycle phase in which they are created, unless they are noted as being in draft or outline form in Section 5.4. They may be presented in an unreleased form at the review which verifies them and then be released immediately following incorporation of comments from that review. Prior to release, the documents shall be controlled by the LDUA Control System Cognizant Engineer.

## WHC-SD-TD-SDP-001, Rev 0

## 9.2 CONFIGURATION CONTROL OF SOFTWARE

### 9.2.1 Identification Of Software

The LDUA integrated software shall be issued a supporting document number according to EP-1.1 (Ref 2). A Computer Software Description (EP 2.1, section 5.3.2, Ref 2) bearing this number shall be prepared and maintained as the actual entity of release and change control. This document shall list: the identification and revision levels of all the software components which comprise the integrated software; the documents numbers and revision levels of related supporting documents; the name of the software custodian (see section 9.2.3) and identification of the software repositories (see section 9.2.2) which physically contain the software components; and a listing of identification and revision levels of all the modules that make up each software component.

Software components shall be controlled as computer files. These files may contain various kinds of data or program modules. Appropriate identifiers shall be assigned by the Lead Software Engineer to files, modules, and any separately identifiable parts of modules for category B (Special Commercial), C (Existing RTDP), or D (Application Specific) software components. All files, modules, and procedures shall carry their identifier so that it displays on listings and outputs, wherever this is practicable. The Lead Software Engineer shall maintain and control assignments of specific identifiers to software components.

The identifier for software components shall be further applied such that it is readily apparent in an appropriate format on the LDUA computer systems on which it resides. For example: Software file names, as they appear in the computer system file directories, should reflect the file identifier.

### 9.2.2 Physical Control Of Software

Computer software shall be physically controlled from a software repository. Software repositories shall be implemented on the standard file system for the computers which are used by the LDUA system. A directory structure shall be established for each repository that contains the files that make up a configuration of the software component. This directory structure shall be hierarchical and shall resolve to a single root directory for all the directories that contain the files for a single revision of the software component. Each revision of the software component shall be a complete stand-alone copy (as opposed to only the changes from an earlier revision). Archiving utilities can be used to contain revisions of the software so long as it is possible to reconstruct a verbatim copy from the archive, including the directory structure.

## WHC-SO-TD-SDP-001, Rev 0

Access control to the repository shall be provided by the security feature of the computer system on which it is implemented. The Software Custodian for the repository shall assure that these security features are properly applied. Only one individual at a time shall be authorized to make modifications to a software component.

The software repository shall contain the master copy of a software component, and all application copies shall be made from the master copy. Backups of the contents of the software repository shall be made to assure protection from loss or damage. At least two separate backup copies of the repository shall be maintained at all times, and shall be kept in physically separated locations so as to prevent a single facility accident from destroying both copies.

Category A (Standard Commercial) software components (see section 5.2) are received on the manufacturer's standard distribution media (mag tape, floppy disk, etc), and are installed from that media onto the target computer. The distribution media shall be retained and controlled by the software custodian (see section 9.2.3) and shall serve the purpose of a software repository. Backup copies and copies for installation shall be controlled by the license agreement with the manufacturer and by WHC practices for use of commercial software.

Introduction of new software components or new versions of existing software component into the software repository are controlled. Refer to Section 9.2.4 for an explanation of these controls.

### 9.2.3 Software Custodian

The Software Custodian is the designated person who maintains control of and access to computer software and its media. The software custodian is responsible for the software repository and controls all access to it, all distributions of software from it, and all backups of it.

### 9.2.4 Release And Change Control Of Software

The LDU software shall be released via an Engineering Data Transmittal (EDT) form according to EP-1.6 (Ref 2). Changes to released software shall be controlled via an Engineering Change Notice (ECN) according to EP-2.2 (Ref 2). The EDT and any ECNs shall be applied to the Computer Software Description (see section 9.2.1). The Lead Software Engineer shall deliver a copy of the approved EDT or ECN to the Software Custodian with media copies of the software itself. The Software Custodian shall then add the software from the media copy to the repository and log the change.

Prior to release, changes to the software shall be controlled by the LDU Control System Cognizant Engineer or by the Lead Software Engineer (refer to



## WHC-SO-TD-SDP-001, Rev 0

Section 8.0). This means that the Software Repository shall be established by the Lead Software Engineer when the first software components appear. Additions or changes to unreleased software within the repository shall be the responsibility of the LDUA Control System Cognizant Engineer or Lead Software Engineer during the time it is being created and debugged. No audit trail of changes to software items in the repository is required prior to initial release of the software.

Versions of software shall carry lettered revision numbers prior to release and numbered revision numbers after release. The revision numbers shall be displayed on each configuration item in the same place and with the same prominence as the item's identification.

Prototype and Feature Test Software (refer to Section 7.1.3) shall not be released, but shall be controlled as pre-release software as noted above.

## 9.2.5 Problem Reporting And Corrective Action

### 9.2.5.1 Testing Phase Problems

During the Testing Phase of the software life cycle (and after initial release of the software), problem reporting and corrective action shall be implemented by the testing procedures and tracked by the test log for the LDUA system.

### 9.2.5.2 Operations Phase Problems

During the Operations and Maintenance Phase of the software life cycle, problems, errors, or difficulties with the software, or requests for changes shall be reported on a Software Change Request and Problem Report (SCR/PR), which shall be similar in format to the one in SP-6.3 (Ref. 3).

- Each SCR/PR shall be numbered and a log shall be maintained which tracks each SCR/PR.
- SCR/PRs shall be delivered to Software Custodian who shall enter them into the SCR/PR log and forward them to LDUA Control System Cognizant Engineer.
- LDUA Control System Cognizant Engineer shall assess problem or change request and assign it for consideration to individual with appropriate qualifications.
- A determination shall be made whether problem requires corrective action, whether corrective action requires changes to the baseline configuration, and how extensive the modification will be. If modifications are

## WHC-SD-TD-SDP-001, Rev 0

extensive, changes to baseline documents such as computer software requirements specifications or computer software design descriptions may be required, and a "mini-life cycle" may be used with appropriate V&V.

- If no corrective action is needed, SCR/PR is closed out at that point.
- If modification is required, resources are assigned, authority to modify the affected software components is granted by the LDUA Control System Cognizant Engineer to a designated software engineer, and working copies of software to be modified are distributed from the software repository. This effort may involve coordination of work among local and off-site organizations: for problems involving category A (Standard Commercial) or B (Special Commercial) software, the commercial supplier may offer a new revision of the software, or may only provide suggested work-arounds; for problems involving category C (Existing RTDP) software, any changes may require review and approval by a central body that maintains the code for the shared community of RTDP users.
- When modifications to software components are complete and verified, an ECN is approved and issued for the new versions of the software and any affected documents (A single ECN can cover many SCR/PRs). The new version of the software is delivered to the Software Custodian who introduces it into the software repository, and the LDUA is re-certified by validation testing. The SCR/PR is closed out at this point.

### 9.2.6 Physical Media Control

Computer Software Media (also simply referred to as Media) is the different kinds of tapes, discs, etc. used by the computer for storing and retrieving software in electronic form (as opposed to printed on paper).

Physical media control assures that the stored data or software comes from a known and approved source, is traceable to its source, is physically retrievable, and cannot be lost or compromised by day-to-day operations or catastrophic events. The provisions of physical media control are:

- A log shall be kept by the Software Custodian of when software is copied onto physical media from the software repository (backup copies are not included). Each copy shall be serial-numbered.
- Media shall carry a label containing:
  - SDR  
SFC  
SFR
  - Software component identifier
  - Serial number (from the log) and date of copy.
  - Responsible individual/organization.

WHC-SD-TD-SDP-001, Rev 0

- Initials of Software Custodian.

### 9.2.7 Configuration Status Accounting And Reporting

A database shall be established for tracking existence and status of all configuration items. The LDUA Control System Cognizant Engineer shall be responsible for establishing and maintaining this database.

### 10.0 IMPACT LEVELS AND APPROVALS

The impact level and approval signature requirements for each deliverable are given in the table below. The impact level of all LDUA software has been determined according to EP-2.1 (Ref 2), Section 5.1, which references EP-1.7 (Ref 2) as basis of determination.

## WHC-SD-TD-SDP-001, Rev 0

## SOFTWARE DELIVERABLE IMPACT LEVEL/APPROVAL MATRIX

Deliverable	Impact Level	Lead Software Engineer	LDUA Cog. Engineer	System Lead	Cog. Manager	QA	Safety
Computer Software Requirements Specification (CSRS)	3SQ	-	A	A	A	A	A
Computer Software Design Description (CSDD)	3Q	-	A	-	A	A	R
Testing Documents	3SQ	-	A	A	A	A	A
SW Operation Manual	3Q	-	A	A	A	A	R
Technical Reference Documents	3Q	A	A	-	A	R	PR
Computer Software Description	3Q	A	A	-	A	A	PR
V&V Records	3Q	A	A	A	A	A	R
V&V Report	3SQ	A	A	A	A	A	R
Prototype Software	4	-	-	-	-	-	-

## LEGEND:

A = Approve  
 R = Review  
 PR = Post Review  
 I = Information

WHC-SD-TD-SDP-001, Rev 0

## 11.0 REFERENCES

1. WHC-CM-4-2, Quality Assurance Manual, Westinghouse Hanford Co., Richland, Washington
  - QR 19.0 Software Quality Assurance Requirements
2. WHC-CM-6-1, Standard Engineering Practices, Westinghouse Hanford Co., Richland, Washington
  - EP-1.1 Engineering Document Identification
  - EP-1.2 Preparation of Engineering Specifications
  - EP-1.6 Engineering Data Transmittal (EDT)
  - EP-1.7 Engineering Document Approval and Release Requirements
  - EP-2.1 Computer Software
  - EP-2.2 Engineering Document Change Control
  - EP-4.1 Design Verification Requirements
  - EP-4.2 Testing Practices
3. WHC-CM-3-10, Software Practices, Westinghouse Hanford Co., Richland, Washington, 1992
4. Glenford J. Myers, The Art of Software Testing, John Wiley and Sons, New York, New York, 1979
5. Meilir Page-Jones, The Practical Guide to Structured Systems Design, Yourdon Press, New York, New York, 1980
6. Institute of Electrical and Electronics Engineers, Software Engineering Standards, New York, NY, 1987.

# SOFTWARE CONFIGURATION PROCEDURES

## Software Configuration Index

1. Software Configuration Index
2. Software Change Notification List
3. LDUA Authorized Users List
4. Controlled Versions List
5. Minimum Retest Procedure
6. Problem Report/Change Request Log

# Software Change Notification List

For changes to the SDAS User Interface software notify the following organizations:

Tank Waste Remediation System



# SDAS User Interface Controlled Versions

Version	Date	Authorized uses
28-Feb-96	28-Feb-96	Development only of unit 1
19-Mar-96	19-Mar-96	Development only of unit 1
26-Mar-96	26-Mar-96	Development and Integration testing of unit 1
29-Jun-96	29-Jun-96	Development, Qualification Testing, and Hot Deployment testing of unit 1
18-Feb-97	18-Feb-97	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks
1.0.6	03-Apr-97	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks
1.0.7	19-Mar-98	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks

## SDAS 1.0.7 Minimum Retest Procedure

Tests the modifications made as a result of resolving Change Request/Problem Report numbers 55, 56, 57, 58, 59, 60, and 62.

1. Attach console terminals to both the LDUA Arm Level Controller and the GISC CPU.
2. Power down the Subsystem controller and then restore power.
3. Observe the boot sequence of both computers, watching for errors.
4. Verify the correct Position server software is loaded.
5. Verify that the Position Server is started and transmits updates.
6. Power down the SCS Console and then restore power.
7. Observe the SCS Console boot sequence.
8. Verify that the correct software of loaded and run automatically.
9. Verify that the SGCS software does not terminate due to an error.
10. Log onto the SCS Console as oper.
11. Start the World Model software from the World Model script icon.
12. Check for the correct operation of the add/change EE button, especially with the Extended Reach End Effector.
13. Check that the collision queue looks reasonable.
14. Check for the correct operation of the Locate MDS button.
15. Check that the collision queue looks reasonable.
16. Check for the correct operation of the Restart button.
17. Check that the collision queue looks reasonable.
18. Check for the correct operation of the Save World and Load World buttons.
19. Check that the collision queue looks reasonable after a Load World operation.
20. Login to the oper account on drum and observe that the correct software (TopSDAS and VideoSDAS) is loaded automatically.
21. Reboot the SDAS Server and observe the boot sequence.
22. Verify that the correct software is being loaded by observing the version number printed by the boot sequence.
23. Verify that there are no errors printed by the boot sequence.
24. Verify that the time is set correctly, including proper daylight savings time.
25. Start the TopSDAS software and verify that it connects correctly to the SDAS Server.
26. Verify that the Extended Reach End Effector is mounted.
27. Verify that LDUA robot position data is available.
28. Verify that the correct TIP identification data is being returned.
29. Check the operation of the TopSDAS control panel for accessing end effectors.
30. Verify that the correct operation of the Extended Reach End Effector control panel.
31. Check the operation of the TopSDAS and Error Display control panels for detecting and displaying SDAS server error messages.
32. Quit the TopSDAS software and verify that it disconnects correctly from the SDAS Server.
33. Start the VideoSDAS software and verify that it connects correctly to the SDAS Server.
34. Check the operation of the VideoSDAS control panel for identifying or specifying end

## SDAS 1.0.7 Minimum Retest Procedure

- effectors.
35. Verify that the correct operation of the video switcher control panel.
  36. Verify that the correct operation of both video titler control panels.
  37. Check the operation of the VideoSDAS and Error Display control panels for detecting and displaying SDAS server error messages.
  38. Quit the VideoSDAS software and verify that it disconnects correctly from the SDAS Server.
  39. Login to the oper account on harp and observe that the correct software (GuestSDAS) is loaded automatically.
  40. Start the GuestSDAS software and verify that it connects correctly to the SDAS Server.
  41. Check the operation of the VideoSDAS control panel for identifying or specifying end effectors.
  42. Verify that the correct operation of the video switcher control panel.
  43. Quit the GuestSDAS software and verify that it disconnects correctly from the SDAS Server.

## SDAS 1.0.6 Minimum Retest Procedure

1. Attach console terminals to both the LDUA Arm Level Controller and the GISC CPU.
2. Power down the Subsystem controller and then restore power.
3. Observe the boot sequence of both computers, watching for errors.
4. Verify the correct Position server software is loaded.
5. Verify that the Position Server is started and transmits updates.
6. Power down the SCS Console and then restore power..
7. Observe the SCS Console boot sequence.
8. Verify that the correct software of loaded and run automatically.
9. Verify that the SGCS software does not terminate due to an error.
10. Log onto the SCS Console as oper.
11. Start the World Model software from the World Model script icon.
12. Connect the real and simulated robots.
13. Operate both robots and verify that both robots correctly display the robot positions.
14. Check for the correct operation of the force moment sensor.
15. Login to the oper account on drum and observe that the correct software is loaded automatically.
16. Reboot the SDAS Server and observe the boot sequence.
17. Verify that the correct software is being loaded by observing the version number printed by the boot sequence.
18. Verify that there are no errors printed by the boot sequence.
19. Start the TopSDAS software and verify that it connects correctly to the SDAS Server.
20. Verify that LDUA robot position data is available.
21. Verify that the correct TIP identification data is being returned.
22. Verify that the correct Cartesian data is being returned.
23. Verify that the correct joint data is being returned.
24. Verify that the correct operation of the video switcher control panel.
25. Check the operation of the TopSDAS control panel for accessing end effectors.
26. Check the operation of the TopSDAS and Error Display control panels for detecting and displaying SDAS server error messages.
27. Quit the TopSDAS software and verify that it disconnects correctly from the SDAS Server.
28. Login to the oper account on harp and observe that the correct software is loaded automatically.
29. Start the GuestSDAS software and verify that it connects correctly to the SDAS Server.
30. Verify that the correct operation of the video switcher control panel.
31. Quit the GuestSDAS software and verify that it disconnects correctly from the SDAS Server.

# SDAS Release Notes

## Version 1.0.6

This release of the Supervisory Data Acquisition System (SDAS) is a Hanford specific release. None of the non-Hanford pieces or features have been tested. Here is the list of Change Requests and Problem Reports that have been incorporated into this release.

CR/PR No.	Short Descriptive Name
24	SDAS User Interface crashes frequently
25	Many Opto22 errors on, requires many reboots
26	Shorten long (1024 byte) error message buffers
27	ChannelList VI name loading hangs from TopSDAS
28	Need new control panel for HRSVS #2
29	Get frequent busy channel errors from both VCR control panels.
31	Error message driver discards error messages
32	Provide Opto22 timeout status to SDAS User Interface
33	Provide display of Opto22 timeout status to user
34	Error on Opto22/ISIO-2 port halts SDAS CPU
35	Status lights on VCR control panels no longer work
36	Need to remove non-functional control panels
37	Titler display of robot position too slow
38	Titler #2 doesn't work
40	Robot position client/server software is not reliable
49	HRSVS#2 VI hangs LabVIEW.
52	Produce formal release of SDAS software.

The Following Documents have been modified to reflect the changes to SDAS.

Document Number	Revision	Date	Document Name
WHC-SD-TD-OMM-001	2	04/25/97	OPERATION AND MAINTENANCE MANUAL FOR THE LDUA SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM (LDUA SYSTEM 4200) AND CONTROL NETWORK (LDUA SYSTEM 4400)
SNL-LDUA-96-006	V1 R2	03/10/97	The Supervisory Data Acquisition System (SDAS) Programmer's Manual
SNL-LDUA-96-009	V1 R1	04/04/97	The SDAS Programmer's Manual - Appendix A: Device Driver Descriptions

# SDAS USER INTERFACE

# Software Change Notification List

For changes to the SDAS User Interface software notify the following organizations:

Tank Waste Remediation System

# SDAS User Interface Controlled Versions

Version	Date	Authorized uses
28-Feb-96	28-Feb-96	Development only of unit 1
19-Mar-96	19-Mar-96	Development only of unit 1
26-Mar-96	26-Mar-96	Development and Integration testing of unit 1
29-Jun-96	29-Jun-96	Development, Qualification Testing, and Hot Deployment testing of unit 1
18-Feb-97	18-Feb-97	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks
1.0.6	03-Apr-97	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks
1.0.7	19-Mar-98	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks



## SDAS 1.0.7 Minimum Retest Procedure

Tests the modifications made as a result of resolving Change Request/Problem Report numbers 55, 56, 57, 58, 59, 60, and 62.

1. Attach console terminals to both the LDUA Arm Level Controller and the GISC CPU.
2. Power down the Subsystem controller and then restore power.
3. Observe the boot sequence of both computers, watching for errors.
4. Verify the correct Position server software is loaded.
5. Verify that the Position Server is started and transmits updates.
6. Power down the SCS Console and then restore power.
7. Observe the SCS Console boot sequence.
8. Verify that the correct software of loaded and run automatically.
9. Verify that the SGCS software does not terminate due to an error.
10. Log onto the SCS Console as oper.
11. Start the World Model software from the World Model script icon.
12. Check for the correct operation of the add/change EE button, especially with the Extended Reach End Effector.
13. Check that the collision queue looks reasonable.
14. Check for the correct operation of the Locate MDS button.
15. Check that the collision queue looks reasonable.
16. Check for the correct operation of the Restart button.
17. Check that the collision queue looks reasonable.
18. Check for the correct operation of the Save World and Load World buttons.
19. Check that the collision queue looks reasonable after a Load World operation.
20. Login to the oper account on drum and observe that the correct software (TopSDAS and VideoSDAS) is loaded automatically.
21. Reboot the SDAS Server and observe the boot sequence.
22. Verify that the correct software is being loaded by observing the version number printed by the boot sequence.
23. Verify that there are no errors printed by the boot sequence.
24. Verify that the time is set correctly, including proper daylight savings time.
25. Start the TopSDAS software and verify that it connects correctly to the SDAS Server.
26. Verify that the Extended Reach End Effector is mounted.
27. Verify that LDUA robot position data is available.
28. Verify that the correct TIP identification data is being returned.
29. Check the operation of the TopSDAS control panel for accessing end effectors.
30. Verify that the correct operation of the Extended Reach End Effector control panel.
31. Check the operation of the TopSDAS and Error Display control panels for detecting and displaying SDAS server error messages.
32. Quit the TopSDAS software and verify that it disconnects correctly from the SDAS Server.
33. Start the VideoSDAS software and verify that it connects correctly to the SDAS Server.
34. Check the operation of the VideoSDAS control panel for identifying or specifying end

## SDAS 1.0.7 Minimum Retest Procedure

effectors.

35. Verify that the correct operation of the video switcher control panel.
36. Verify that the correct operation of both video titler control panels.
37. Check the operation of the VideoSDAS and Error Display control panels for detecting and displaying SDAS server error messages.
38. Quit the VideoSDAS software and verify that it disconnects correctly from the SDAS Server.
39. Login to the oper account on harp and observe that the correct software (GuestSDAS) is loaded automatically.
40. Start the GuestSDAS software and verify that it connects correctly to the SDAS Server.
41. Check the operation of the VideoSDAS control panel for identifying or specifying end effectors.
42. Verify that the correct operation of the video switcher control panel.
43. Quit the GuestSDAS software and verify that it disconnects correctly from the SDAS Server.

## SDAS 1.0.6 Minimum Retest Procedure

1. Attach console terminals to both the LDUA Arm Level Controller and the GISC CPU.
2. Power down the Subsystem controller and then restore power.
3. Observe the boot sequence of both computers, watching for errors.
4. Verify the correct Position server software is loaded.
5. Verify that the Position Server is started and transmits updates.
6. Power down the SCS Console and then restore power.
7. Observe the SCS Console boot sequence.
8. Verify that the correct software of loaded and run automatically.
9. Verify that the SGCS software does not terminate due to an error.
10. Log onto the SCS Console as oper.
11. Start the World Model software from the World Model script icon.
12. Connect the real and simulated robots.
13. Operate both robots and verify that both robots correctly display the robot positions.
14. Check for the correct operation of the force moment sensor.
15. Login to the oper account on drum and observe that the correct software is loaded automatically.
16. Reboot the SDAS Server and observe the boot sequence.
17. Verify that the correct software is being loaded by observing the version number printed by the boot sequence.
18. Verify that there are no errors printed by the boot sequence.
19. Start the TopSDAS software and verify that it connects correctly to the SDAS Server.
20. Verify that LDUA robot position data is available.
21. Verify that the correct TIP identification data is being returned.
22. Verify that the correct Cartesian data is being returned.
23. Verify that the correct joint data is being returned.
24. Verify that the correct operation of the video switcher control panel.
25. Check the operation of the TopSDAS control panel for accessing end effectors.
26. Check the operation of the TopSDAS and Error Display control panels for detecting and displaying SDAS server error messages.
27. Quit the TopSDAS software and verify that it disconnects correctly from the SDAS Server.
28. Login to the oper account on harp and observe that the correct software is loaded automatically.
29. Start the GuestSDAS software and verify that it connects correctly to the SDAS Server.
30. Verify that the correct operation of the video switcher control panel.
31. Quit the GuestSDAS software and verify that it disconnects correctly from the SDAS Server.

# SDAS Release Notes

## Version 1.0.6

This release of the Supervisory Data Acquisition System (SDAS) is a Hanford specific release. None of the non-Hanford pieces or features have been tested. Here is the list of Change Requests and Problem Reports that have been incorporated into this release.

CR/PR No.	Short Descriptive Name
24	SDAS User Interface crashes frequently
25	Many Opto22 errors on, requires many reboots
26	Shorten long (1024 byte) error message buffers
27	ChannelList VI name loading hangs from TopSDAS
28	Need new control panel for HRSVS #2
29	Get frequent busy channel errors from both VCR control panels.
31	Error message driver discards error messages
32	Provide Opto22 timeout status to SDAS User Interface
33	Provide display of Opto22 timeout status to user
34	Error on Opto22/ISIO-2 port halts SDAS CPU
35	Status lights on VCR control panels no longer work
36	Need to remove non-functional control panels
37	Titler display of robot position too slow
38	Titler #2 doesn't work
40	Robot position client/server software is not reliable
49	HRSVS#2 VI hangs LabVIEW.
52	Produce formal release of SDAS software.

The Following Documents have been modified to reflect the changes to SDAS.

Document Number	Revision	Date	Document Name
WHC-SD-TD-OMM-001	2	04/25/97	OPERATION AND MAINTENANCE MANUAL FOR THE LDUA SUPERVISORY CONTROL AND DATA ACQUISITION SYSTEM (LDUA SYSTEM 4200) AND CONTROL NETWORK (LDUA SYSTEM 4400)
SNL-LDUA-96-006	V1 R2	03/10/97	The Supervisory Data Acquisition System (SDAS) Programmer's Manual
SNL-LDUA-96-009	V1 R1	04/04/97	The SDAS Programmer's Manual - Appendix A: Device Driver Descriptions

# SDAS SERVER AND DRIVERS

# Software Change Notification List

For changes to the SDAS Server and Drivers software notify the following organizations:

Idaho National Engineering Laboratory

Sandia National Laboratories

Tank Waste Remediation System

# SDAS Server and Drivers Controlled Versions

Version	Date	Authorized uses
1.0.1	19-Jan-96	Development only of unit 1
1.0.2	07-Mar-96	Development only of unit 1
1.0.3	23-Apr-96	Development and Integration testing of unit 1
1.0.4	20-Jun-96	Development and Integration testing of unit 1
1.0.5	08-Aug-96	Development, Qualification Testing, and Hot Deployment testing of unit 1
18-Feb-97	18-Feb-97	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks
10-Mar-97	10-Mar-97	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks
1.0.6	03-Apr-97	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks
1.0.7	19-Mar-98	Development, Qualification Testing, and deployment of unit 1 in Hanford Tanks

## Minimum Retest Procedure

For changes to the SDAS Server and Drivers software the following tests must be run as the minimum:

1. Reboot the SDAS Server and observe the boot sequence.
2. Verify that the correct software is being loaded by observing the version number printed by the boot sequence.
3. Verify that there are no errors printed by the boot sequence.
4. Run the appropriate SDAS User Interface control panels to test the specific features that were modified.



# SPAR LDU A CONSOLE

# Software Change Notification List

For changes to the Spar LDUA software notify the following organizations:

Idaho National Engineering Laboratory

Oak Ridge National Laboratory

Sandia National Laboratories

Spar Aerospace, Ltd.

Tank Waste Remediation System

# Spar LDUA Controlled Versions

Version	Date	Authorized uses
9-Aug-96	9-Aug-96	Development and Qualification Testing testing of unit 1
13-Aug-96	13-Aug-96	Development and Qualification Testing testing of unit 1
16-Aug-96	16-Aug-96	Development, Qualification Testing, and Hot Deployment testing of unit 1

# Minimum Retest Procedure

The Spar LDUA software is composed of the following components:

1. The LDUA Console software
2. The Supervisory Graphics Control Software (SGCS)
3. The Subsystem Controller software (SSC or ALC)
4. The LDUA Diagnostics
5. The GISC Application Programming Interface (API) software

Each component has a unique place in the system and each requires a separate minimum retest procedure.

For changes to the **LDUA Console software** the following tests must be run as the minimum:

1. Power down the Subsystem controller and then restore power.
2. Wait for the Subsystem controller boot sequence to complete.
3. Logout of the LDUA Console and log back in as oper.
4. Verify that the correct software is loaded and run automatically.
5. Test the specific features that were modified.

For changes to the **Supervisory Graphics Control Software (SGCS)** the following tests must be run as the minimum:

1. Power down the Subsystem controller and then restore power.
2. Wait for the Subsystem controller boot sequence to complete.
3. Power down the SCS Console and then restore power.
4. Observe the SCS Console boot sequence.
5. Verify that the correct software of loaded and run automatically.
6. Verify that the SGCS software does not terminate due to an error.
7. Log onto the SCS Console as oper.
8. Start the World Model software from the WorldModel script icon.
9. Connect the real and simulated robots.
10. Operate both robots and verify that both robots correctly display the robot positions.
11. Test the specific features that were modified.

## Minimum Retest Procedure

For changes to the **Subsystem Controller software (SSC or ALC)** the following tests must be run as the minimum:

1. Attach console terminals to both the LDUA Arm Level Controller and the GISC CPU.
2. Power down the Subsystem controller and then restore power.
3. Observe the boot sequence of both computers, watching for errors.
4. Verify the the correct ALC software is loaded from the flash EPROM.
5. Verify that the ALC software is started and runs without errors.
6. Verify that the Position Server software loads and runs without causing errors on either computer.
7. Verify that the robot can be operated from the pendant.
8. Verify that the robot can be operated from the LDUA Console.
9. Test the specific features that were modified.

For changes to the **LDUA Diagnostics software** the following tests must be run as the minimum:

1. Attach console terminals to the LDUA Arm Level Controller.
2. Power down the Subsystem controller and then restore power.
3. Observe the boot sequence of the ALC, watching for errors.
4. Verify the the correct ALC software is loaded from the flash EPROM.
5. Verify that the ALC software is started and runs without errors.
6. Interrupt the boot sequence during the systemUp countdown sequence.
7. Run the lduaDiag routine.
8. Test the specific features that were modified.

Changes to the **GISC Application Programming Interface (API) software** are really changes to both the **Subsystem Controller software (SSC or ALC)** and the **Position Server software**. The minimum retest procedure for each of these two software packages must be run.

# LDUA POSITION CLIENT/SERVER

# Software Change Notification List

For changes to the Position Client & Server software notify the following organizations:

Idaho National Engineering Laboratory  
Sandia National Laboratories  
Tank Waste Remediation System

# SCS Position Controlled Versions

Version	Date	Authorized uses
1.0.0	06-Aug-96	Development and Integration testing of unit 1
1.0.1b	14-Aug-96	Development, Qualification Testing, and Hot Deployment testing of unit 1
-	-	Merged with SDAS Server software as of release 2/18/97



# Minimum Retest Procedure

For changes to the Position Client & Server software the following tests must be run as the minimum:

1. Attach console terminals to both the LDUA Arm Level Controller and the GISC CPU.
2. Power down the Subsystem controller and then restore power.
3. Observe the boot sequence of both computers, watching for errors.
4. Verify the the correct Position server software is loaded.
5. Verify that the Position Server is strated and waits for a connection from the Position Client.
6. Reboot the SDAS Server and observe the boot sequence.
7. Verify that the correct Position Client software is being loaded.
8. Verify that the Position Client software starts and connects to the Position Server software.
9. Run the TopSDAS control panel software and verify that LDUA robot position data is available.
10. Verify that the correct TIP identification data is being returned.
11. Verify that the correct cartesian data is being returned.
12. Verify that the correct joint data is being returned.
13. Test the specific features that were modified.

# WORLD MODEL

# Software Change Notification List

For changes to the World Model software notify the following organizations:

Sandia National Laboratories  
Tank Waste Remediation System

# SCS World Model Controlled Versions

Version	Date	Authorized uses
08-Aug-96	08-Aug-96	Development and Qualification Testing testing of unit 1
21-Aug-96	21-Aug-96	Development, Qualification Testing, and Hot Deployment testing of unit 1
19-Feb-97	19-Feb-97	Development, Qualification Testing, and deployment of unit 1 in tanks T-106 and AX-104
06-Mar-97	06-Mar-97	Development, Qualification Testing, and deployment of unit 1 in tanks T-106 and AX-104
03-Apr-97	03-Apr-97	Development, Qualification Testing, and deployment of unit 1 in tanks T-106 and AX-104
13-Jul-98	13-Jul-98	Development, Qualification Testing, and deployment of unit 1 in tanks T-106 and AX-104

# Minimum Retest Procedure

For changes to the World Model software the following tests must be run as the minimum:

1. Restart the World Model software from the WorldModel script icon.
2. Test the specific features that were modified.

# SOFTWARE CHANGE NOTIFICATION LIST

# Software Change Notification List

The contact information for each organization is listed below:

Organization	Contact Information
Idaho National Engineering Laboratory	Cal Christianson 2525 Fremont Avenue MS 3710 Idaho Falls, ID 83402 (208) 526-3653 voice (208) 526-4366 FAX cal2@inel.gov
Oak Ridge National Laboratory	Barry Burks Box 2008 Bldg. 7601 MS 6304 Oak Ridge, TN 37831-6304 (423) 576-7350 voice (423) 576-2081 FAX burksbl@ornl.gov
Sandia National Laboratories	Diane Schafer Callow Box 5800 MS 1176 Albuquerque, NM 87185-1176 (505) 844-2377 voice (505) 845-7080 FAX dmschaf@isrc.sandia.gov
Spar Aerospace, Ltd.	Brian Hill 9445 Airport Road Brampton, Ontario L6S4J3 (905) 790-4473 voice (905) 790-4430 FAX bhill@spar.ca
Tank Waste Remediation System	Geoffrey A. Barnes Box 450 B4-51 Richland, WA 99352 (509)376-2241 voice (509)372-0504 FAX geoffrey_a_barnes@rl.gov

LDUA SOFTWARE CHANGE  
REQUEST/PROBLEM  
REPORT LOG



LDUA  
SOFTWARE CUSTODIAN'S  
NOTEBOOK  
LDUA-SCN-97-001

## LDUA Software Change Request/Problem Report Log

The following CR/PR sheets were lost by PNNL and are not included in the log

#26 SDAS Server	Resolved 04/03/97	Shorten long (1024 byte) error message buffers.
#27 SDAS User Int.	Resolved 04/03/97	ChannelList VI name loading hangs from TopSDAS.
#31 SDAS Server	Resolved 04/03/97	Error message driver discards error messages.
#32 SDAS Server	Resolved 04/03/97	Provide Opto22 timeout status to SDAS User Interface.
#33 SDAS User Int.	Resolved 04/03/97	Provide display of Opto22 timeout status to user.
#36 SDAS User Int.	Resolved 04/03/97	Need to remove non-functional control panels.

## LDUA SOFTWARE CHANGE REQUEST / PROBLEM REPORT LOG

CR/PR No.	Software Name	Report Date	Current Status	Resolved Date	Short Descriptive Name
1	Spar LDUA	08/29/96	Deferred		LDUAHomeToZero/unstow autoseq. problem
2	Spar LDUA	08/29/96	Deferred		Shoulder yaw position error
3	Spar LDUA	08/29/96	Deferred		Better file dialogs
4	Spar LDUA	08/29/96	Deferred		Bad VPM autoseq. maximum value
5	Spar LDUA	08/29/96	Deferred		Want Acknowledge all button
6	Spar LDUA	08/29/96	Deferred		Simulation robot flies apart
7	Spar LDUA	08/29/96	Deferred		Allow comments in autoseq. files
8	Spar LDUA	08/29/96	Deferred		Want canned home joints to zero command
9	Spar LDUA	08/29/96	Deferred		Display when position data is/is not valid
10	Spar LDUA	08/29/96	Deferred		Error message should tell which joint
11	Spar LDUA	08/29/96	Deferred		Display error & warning message numbers
12	Spar LDUA	08/29/96	Deferred		Want purge-off are you sure?
13	Spar LDUA	08/29/96	Deferred		Move stow/unstow buttons to LDUA screen
14	Spar LDUA	08/29/96	Deferred		Select VPM axis command fails
15	Spar LDUA	08/29/96	Deferred		Want to change tube seq. while deployed
16	Spar LDUA	08/29/96	Deferred		Display net distance inner to outer tubes
17	Spar LDUA	08/29/96	Deferred		Want flammable are you sure?
18	Spar LDUA	08/29/96	Deferred		Don't want singularity messages during joint moves
19	Spar LDUA	08/29/96	Deferred		Want two interlock indicators per joint
20	Spar LDUA	08/29/96	Deferred		Home LDUA command does not work at angle
21	Spar LDUA	08/29/96	Deferred		Can't mount end effector in outer/inner seq.
22	Spar LDUA	08/29/96	Deferred		Want buttons grayed out
23	Spar LDUA	08/29/96	Deferred		Want LDUA joints to auto home to zero on VPM move
24	SDAS User Int	01/15/97	Resolved	01/15/97	SDAS User Interface crashes frequently
25	SDAS Server	01/15/97	Resolved	01/15/97	Many Opto22 errors on, requires many reboots
26	SDAS Server	01/15/97	Resolved	04/03/97	Shorten long (1024 byte) error message buffers
27	SDAS User Int	01/15/97	Resolved	04/03/97	ChannelList VI name loading hangs from TopSDAS
28	SDAS User Int	01/15/97	Resolved	01/24/97	Need new control panel for HRSVS #2
29	SDAS Server	01/15/97	Resolved	01/30/97	Get frequent busy channel errors from both VCR control panels.
30	SDAS Server	01/15/97	Deferred		Time based records do not process under certain conditions.
31	SDAS Server	01/15/97	Resolved	04/03/97	Error message driver discards error messages
32	SDAS Server	01/15/97	Resolved	04/03/97	Provide Opto22 timeout status to SDAS User Interface
33	SDAS User Int	01/15/97	Resolved	04/03/97	Provide display of Opto22 timeout status to user
34	SDAS Server	01/21/97	Resolved	02/04/97	Error on Opto22/SIO-2 port halts SDAS CPU
35	SDAS User Int	01/26/97	Resolved	02/10/97	Status lights on VCR control panels no longer work
36	SDAS User Int	01/26/97	Resolved	04/03/97	Need to remove non-functional control panels
37	SDAS User Int	01/26/97	Resolved	01/30/97	Titler display of robot position too slow
38	SDAS User Int	01/26/97	Resolved	01/30/97	Titler #2 doesn't work
39	World Model	01/27/97	Resolved	01/30/97	Add model of tank AX-104
40	Robot Pos. C/	01/27/97	Resolved	01/30/97	Robot position client/server software is not reliable
41	World Model	01/27/97	Resolved	02/19/97	Add the capability to read and display the LDUA Force Moment Sensor.
42	World Model	01/27/97	Resolved	01/30/97	Allow the user to specify that there is NO end effector on the arm.
43	World Model	01/27/97	Resolved	01/30/97	Allow the user to delete a piece of In-Tank Hardware

## LDUA SOFTWARE CHANGE REQUEST / PROBLEM REPORT LOG

CR/PR No.	Software Name	Report Date	Current Status	Resolved Date	Short Descriptive Name
44	World Model	01/27/97	Resolved	01/30/97	Truck azimuth entered into LDUA Console and World Model differ by 180 degrees.
45	World Model	01/27/97	Resolved	01/30/97	Add capability to save multiple configurations.
46	World Model	01/27/97	Resolved	02/10/97	Collision check real robot as well as simulation robot.
47	World Model	01/27/97	Resolved	01/30/97	No collision checking of ITH after moving truck.
48	World Model	02/10/97	Resolved	02/19/97	Add a gripper end effector with long scraper fingers.
49	SDAS User Int	02/10/97	Resolved	02/10/97	HRSVS#2 VI hangs LabVIEW.
50	World Model	02/11/97	Resolved	02/19/97	Collision between ITH and real robot not detected.
51	World Model	03/01/97	Resolved	03/10/97	Force Moment Sensor indicates overload and doesn't start automatically
52	SDAS Server	03/11/97	Resolved	04/03/97	Produce formal release of SDAS software.
53	SDAS Server	03/11/97	Deferred		Create version of SDAS & GISC software that boots from flash RAM.
54	World Model	04/03/97	Resolved	04/03/97	There are simulated AX-104 Air Lift Circulators in all Cold Test Facility models. Remove them from the CTF model and leave them in the CTF+ALC model.
55	SDAS User Int	07/15/97	Resolved	03/18/97	Add a extended reach end effector control panel.
56	World Model	02/10/98	Resolved	03/19/98	Add a extended reach end effector with sampling scoops.
57	SDAS User Int	03/05/98	Resolved	03/19/98	SDAS User Interface crashes frequently.
58	SDAS User Int	03/05/98	Resolved	03/19/98	EREE control panel dumps sample when opened.
59	SDAS Server	03/05/98	Resolved	03/19/98	SDAS error reports are usually off by one hour.
60	SDAS User Int	03/05/98	Resolved	03/19/98	Want titler to clear screen on exit.
61	SDAS User Int	03/20/98	Deferred		SDAS User Interface still crashes frequently (see 57).
62	SDAS User Int	03/24/98	Resolved	03/24/98	The label on the "Currently Mounted End Effector button" on TopSDAS is not correctly set under all conditions.
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## Change Request and Problem Report

CR/PR Number: 1-231. Software Id. (Name): Spar LDUA Rev: 1.1.0-16-Aug-96System Name: LDUA2. Prepared by: GR Kiebel Date: 8/29/96

3. CR/PR Type: [ ] Change Request [ ] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_  
Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_  
CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_  
Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

# Change Request and Problem Report

CR/PR Number: 1

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description & Justification if Change Request:

The "LduaHomeToZero" command from the pendant, and the "unstow" command, both have a problem if there is an existing autosequence in the buffer. The "LduaHomeToZero" command causes the preexisting sequence to execute, the "unstow" command apparently just fails to do anything until the motion is aborted.

5. Submitter's Priority  High  Medium  Low

6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: _____	Date: _____
Cognizant Manager: _____	Date: _____
CR/PR Preparer: _____	Date: _____
Design Authority: _____	Date: _____

## Change Request and Problem Report

CR/PR Number: 2

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type: [ ] Change Request [] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

The shoulder yaw joint position was observed to be -360 degrees in error: i.e. actual position was 118 degrees and the indication was -242 degrees. Is there a flaw in the software?

5. Submitter's Priority [] High [ ] Medium [ ] Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: 3

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

The file dialogs for reading and writing autosequence files are hard to use. The width of the fields that display path and file names need to be much wider - we are only getting the first few characters in some cases and can't read the whole file or path name. Also, it does not seem possible to navigate up/down the directory structure by just clicking on entries in the list fields.

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: 4

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type: [ ] Change Request [] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

The VPM will go to -551.6 inches, but an autosequence will only accept -549 as a maximum value.

5. Submitter's Priority [] High [ ] Medium [ ] Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_



## Change Request and Problem Report

CR/PR Number: 5

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request [ ] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

There should be an "Acknowledge All" button for errors and warnings (especially warnings). Sometimes the system spews out quite a few messages and acknowledging them one by one is a real pain.

5. Submitter's Priority  High [ ] Medium [ ] Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: 6

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

There is a problem with the SGCS software whenever the Real robot and the Simulation robot have their LTI connection active at the same time. Whenever the Real robot is connected, the Simulation robot flies apart. We have a temporary work around. If we disable the production of deflection compensation packets in the IGRIP shared library, the problem goes away. The problem may be in the Spar code or in the IGRIP code, or both. We are suspicious of a particular section of the deflection compensation packet stuffing code. It appears to be off by one joint.

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 7

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

Autosequence files should allow comments to be inserted (it is not necessary to modify to the autosequence dialog screens to display these comments or to enter them - we can use an external text editor for that).

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 8

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

It would be nice to have a canned "LDUA home joints to zero" command on the LDUA Console, or at least a button on the joint autosequence dialog screen that set all the joint values in the edit line to zero (we have to re-zero the LDUA joints every time the we want to move the VPM, and the LDUA has gone into the lock mode while inside the VPM).

5 Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: 9

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_  
 System Name: \_\_\_\_\_
2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_
3. CR/PR Type:  Change Request [ ] Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
 Display should indicate when the position data is not valid, for example, before purge on,  
 or when LDUA is limped.
5. Submitter's Priority [ ] High  Medium [ ] Low
- 
6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 [ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_/\_\_/\_\_
7. Assigned to: \_\_\_\_\_
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_
9. Software/Documents Affected:
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                     |       |       |       |
|---------------------|-------|-------|-------|
| Cognizant Engineer: | _____ | Date: | _____ |
| Cognizant Manager:  | _____ | Date: | _____ |
| CR/PR Preparer:     | _____ | Date: | _____ |
| Design Authority:   | _____ | Date: | _____ |

## Change Request and Problem Report

CR/PR Number: 10

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

Warning and Error messages should identify which specific joint is at faulted or affected. Sometimes it is easy to tell which one is meant by other system indications, and sometimes it is not.

5. Submitter's Priority  High  Medium  Low

6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 11

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request [ ] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

Warning and Error message numbers should be displayed as part of the messages on the LDUA Console (it is presumed that the numbers given in the Spar Software Manual for pendant error codes would be suitable for this). This provides a concise, unambiguous way to reference messages, and to look up corrective actions in the operating manual.

5. Submitter's Priority [ ] High  Medium [ ] Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 12

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

There should be an "are you sure you want to do this" dialog pop up that appears when the "Purge Off" button is pushed. This pop up should explain that the LDUA will unconditionally go limp if the command is issued, and it should allow the operator to cancel.

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____



## Change Request and Problem Report

CR/PR Number: 13

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_  
 System Name: \_\_\_\_\_
2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_
3. CR/PR Type:  Change Request  Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
 The "Stow" and "Unstow" buttons should be moved to the LDUA screen, or there should be a status indicator added to their present location to give the operator some feedback that the command has been accepted and is in progress. Presently, the only way to tell is to pop back to the LDUA screen, which is awkward. Progress messages during the stow/unstow process would be nice also - some of the other commands have them.
5. Submitter's Priority  High  Medium  Low
- 
6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_
7. Assigned to: \_\_\_\_\_
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_
9. Software/Documents Affected:
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_  
 Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_  
 CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_  
 Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: 14

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type: [ ] Change Request [] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

The select VPM axis command fails intermittently from pendant when VPM is at top position.

5. Submitter's Priority [ ] High [] Medium [ ] Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: 15

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request [ ] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

It is highly desirable to be able the change the VPM tube sequence while the VPM is deployed. Presently, the VPM must be stowed in order to do this.

5 Submitter's Priority [ ] High  Medium [ ] Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_/\_\_/\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 16

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

It would enhance safety when operating in the diagnostic mode to have a display that showed the net distance between the inner and outer VPM tubes so that the operator can avoid unwinding the winches. This display could be a single live number with upper and lower limits displayed, or it could be two live numbers with one number representing the margin from the lower limit and the other number representing the margin from the upper limit (0 would mean at the limit, positive numbers would mean safe clearance, negative number would mean improper clearance).

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 17

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

There should be an "are you sure you want to do this" dialog pop up that appears when the purge mode is changed from flammable to non-flammable tank mode. This pop up should explain the seriousness of issuing this command, and it should allow the operator to cancel.

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 18

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_  
 System Name: \_\_\_\_\_
2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_
3. CR/PR Type:  Change Request  Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
 The announcement of singularity problems during joint mode moves is generally perceived as a nuisance rather than an aid.
5. Submitter's Priority  High  Medium  Low
- 
6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_/\_\_/\_\_
7. Assigned to: \_\_\_\_\_
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_
9. Software/Documents Affected:
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                     |       |       |       |
|---------------------|-------|-------|-------|
| Cognizant Engineer: | _____ | Date: | _____ |
| Cognizant Manager:  | _____ | Date: | _____ |
| CR/PR Preparer:     | _____ | Date: | _____ |
| Design Authority:   | _____ | Date: | _____ |

## Change Request and Problem Report

CR/PR Number: 19

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_  
System Name: \_\_\_\_\_
2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_
3. CR/PR Type:  Change Request [ ] Problem Report  
Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
There should be two new indicators for each LDUA joint to indicate that the joint is enabled to move: the first indicator would tell that the joint was clear of the VPM outer tube and the second indicator would tell that the joint was clear of the riser. Presently, the system just refuses to move the joint if it is inhibited by one of these interlocks, and operator must guess why based on messages that list several possibilities without specifying a particular one.
5. Submitter's Priority [ ] High [ ] Medium  Low
- 
6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_/\_\_/\_\_
7. Assigned to: \_\_\_\_\_
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_
9. Software/Documents Affected:
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                     |       |       |       |
|---------------------|-------|-------|-------|
| Cognizant Engineer: | _____ | Date: | _____ |
| Cognizant Manager:  | _____ | Date: | _____ |
| CR/PR Preparer:     | _____ | Date: | _____ |
| Design Authority:   | _____ | Date: | _____ |

## Change Request and Problem Report

CR/PR Number: 20

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type: [ ] Change Request [X] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

[The home LDUA command (from the pendant) appears not to work when the VPM housing is tilted to 5 degrees from vertical.]

5. Submitter's Priority [ ] High [ ] Medium [X] Low

6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____



## Change Request and Problem Report

CR/PR Number: 21

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type: [ ] Change Request [] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

An end effector cannot be mounted with the VPM in outer/inner sequence because the indentations on the LDUA TIP are covered by the bottom of the outer tube - the TIP does not stick out far enough.

5. Submitter's Priority [ ] High [ ] Medium [] Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 22

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

[A general comment: It is a better interface practice to gray out commands/controls that are invalid in a particular state. At present, commands/controls are only grayed out for supervisor/operator login.]

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 23

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

It would be better to offer the operator the option (perhaps by means of a pop up dialog) to have the LDUA joints automatically homed to zero when a VPM move is commanded, but fails because the LDUA joints are not at zero position. This situation occurs frequently under normal operation because the LDUA joints move off zero when the LDUA locks. It is a pain to have to go into joint autosequence and zero them every time before moving the VPM.

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: 241. Software Id. (Name): SDAS User Intf Rev: \_\_\_\_\_System Name: LVA Unit #12. Prepared by: JE Ellis Date: 1/15/97

3. CR/PR Type: [ ] Change Request [X] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

System crashes frequently. This may be due to improper handling of ~~data~~ buffer data types in LabVIEW CIN's from Sandia.

5. Submitter's Priority [X] High [ ] Medium [ ] Low

6. Change Authority: JK Date: 2/25/97  
[X] Accept [ ] Modify [ ] Reject [ ] Defer Until:   /  /  7. Assigned to: JE Ellis8. Solution Comments Cost/Schedule Estimate:    /   

REWROTE sdasExtSub.c to have a specific action for buffer data types. Also updated each buffer data CIN to refer to the new action.

9. Software/Documents Affected:

SDAS User Intf. SW revision 4/8/97

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: JE EllisDate: 2/11/97Cognizant Manager:   Date: 2/23/97CR/PR Preparer:   Date: 2/11/97Design Authority: JKDate: 2/11/97

# Change Request and Problem Report

CR/PR Number: 25

1. Software Id. (Name): SDAS Server Rev: \_\_\_\_\_

System Name: LQVA Unit #1

2. Prepared by: JE Ellis Date: 1/15/97

3. CR/PR Type: [ ] Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description & Justification if Change Request:

Server has opto 22 errors when booted and requires several reboots to clear all errors.

5. Submitter's Priority  High [ ] Medium [ ] Low

6. Change Authority: [Signature] Date: 2/25/97  
 Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: JE Ellis

8. Solution Comments Cost/Schedule Estimate: \_\_\_ / \_\_\_

Rewrote SDAS Opto22 support routines to incorporate better algorithms. Routines now detect Opto 22 ~~and~~ powerup errors and reinitializing the hardware. Database channels no longer go offline. New rule: Do not regularly access channels to could be powered off.

9. Software/Documents Affected:  
SDAS Server & Drivers version 2/18/97

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: <u>[Signature]</u>	Date: <u>2/27/97</u>
Cognizant Manager: <u>[Signature]</u>	Date: <u>2/28/97</u>
CR/PR Preparer: <u>[Signature]</u>	Date: <u>2/27/97</u>
Design Authority: <u>[Signature]</u>	Date: <u>3/1/97</u>

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## Change Request and Problem Report

CR/PR Number: 281. Software Id. (Name): SDAS User Interface Rev: \_\_\_\_\_System Name: LDA Unit #12. Prepared by: JE Ellis Date: 1/15/973. CR/PR Type:  Change Request [ ] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

New HRSVS<sup>(#2)</sup> is different from old HRSVS<sup>(#1)</sup>. Both will be used, but each requires a unit specific control panel. Add new control panel for HRSVS#2

5. Submitter's Priority  High [ ] Medium [ ] Low6. Change Authority: SA Vail Date: 2/25/97  
 Accept [ ] Modify [ ] Reject [ ] Defer Until: 1/17. Assigned to: JE Ellis8. Solution Comments Cost/Schedule Estimate: 1  
 Modified HRSVS.vi to create HRSVS2.vi and associated sub vi's. Incorporated into TopSDAS.vi

9. Software/Documents Affected:

SDAS User Intf. version 2/18/97  
 SDAS CMM WTC-SD-TD-CMM-001

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: JE EllisDate: 2/28/97Cognizant Manager: John DanusDate: 2/28/97CR/PR Preparer: JE EllisDate: 2/28/97Design Authority: SA VailDate: 2/21/97



## Change Request and Problem Report

CR/PR Number: 291. Software Id. (Name): SDAS Server Rev: \_\_\_\_\_System Name: IDA Unit #12. Prepared by: JE Ellis Date: 1/15/973. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

When VCR control panel is opened server emits  
 busy channel errors for vcr1Trigger or vcr2Trigger.

5. Submitter's Priority  High  Medium  Low6. Change Authority: SP Kehl Date: 2/25/97  
 Accept  Modify  Reject  Defer Until:   /  /  7. Assigned to: JE Ellis8. Solution Comments Cost/Schedule Estimate:    /   

Hardware problem. VCR ~~was~~ wiring was disconnected  
 No ACTION ON SOFTWARE REQUIRED.

9. Software/Documents Affected:

None

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: JE EllisDate: 2/25/97Cognizant Manager: Tom DavisDate: 2/25/97CR/PR Preparer: JE EllisDate: 2/25/97Design Authority: SP KehlDate: 3/1/97

## Change Request and Problem Report

CR/PR Number: 301. Software Id. (Name): SDAS Server Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: JE Ellis Date: 1/15/973. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

*Observed that time based records do not process properly when there is only one in the data base.*

*Side note: This was using sdas.0 that completely broke later. This needs to be tested with known good server.*

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

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## Change Request and Problem Report

CR/PR Number: 341. Software Id. (Name): SDAS Server Rev: \_\_\_\_\_System Name: ADVA Unit #12. Prepared by: JE Ellis Date: 1/31/97

3. CR/PR Type: [ ] Change Request [X] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

When power to an Opto22 drain board is lost, or if the serial cable chain is broken, the Force 3D run light turns red. (I think this means the CPU halted). This is a major problem.

5. Submitter's Priority [X] High [ ] Medium [ ] Low

6. Change Authority: Shankell Date: 2/25/97  
[X] Accept [ ] Modify [ ] Reject [ ] Defer Until: 1 / 17. Assigned to: JE Ellis

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

Error in SDAS programmer's manual describing return error codes for isio.read & procedures, caused coding errors in Opto22 support code & video switcher drivers. Fixed drivers.

9. Software/Documents Affected:

SDAS programmer's Manual WHC-SD-TD-OMM-001  
SDAS Server & Drivers 2/18/97

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: JE EllisDate: 2/28/97Cognizant Manager: ShankellDate: 2/28/97CR/PR Preparer: JE EllisDate: 2/28/97Design Authority: ShankellDate: 3/1/97

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## Change Request and Problem Report

CR/PR Number: 351. Software Id. (Name): SDAS User Intf Rev: \_\_\_\_\_System Name: DA Unit #12. Prepared by: J.E. Ellis / DA Clark Date: 1/26/97

3. CR/PR Type: [ ] Change Request [X] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

The feedback panel lights on both VCR #1 & #2 control panels no longer work. (Also getting occasional busy channel errors, is this related?)

5. Submitter's Priority [ ] High [X] Medium [ ] Low

6. Change Authority: Ch Hill Date: 2/25/97  
[X] Accept [ ] Modify [ ] Reject [ ] Defer Until: 1 / 1 / \_\_\_\_\_7. Assigned to: J.E. Ellis8. Solution Comments Cost/Schedule Estimate: 1

VCR.vi was using sdasGetString instead of sdasGetBjB

9. Software/Documents Affected:

SDAS USER Intf version 2/18/97

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: J.E. EllisDate: 2/28/97Cognizant Manager: [Signature]Date: 2/28/97CR/PR Preparer: [Signature]Date: 2/28/97Design Authority: [Signature]Date: 3/11/97

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## Change Request and Problem Report

CR/PR Number: 37

1. Software Id. (Name): SDAS User Intf Rev: \_\_\_\_\_  
System Name: LDUA Unit #1
2. Prepared by: JE Ellis / Ken Bennett Date: 1/26/97
3. CR/PR Type:  Change Request  Problem Report  
Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
*The Tiller update rate is unacceptably slow. Also, the position displayed is way, way behind the actual position of the arm.*
5. Submitter's Priority  High  Medium  Low
- 
6. Change Authority: JE Ellis Date: 2/25/97  
 Accept  Modify  Reject  Defer Until: 1/1/
7. Assigned to: JE Ellis
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_  
*SDAS User Intf had many channels of LDUA robot position open. Each one sucked up a lot of resources. I now have one VI that gets robot position into a global for all users. Also, the channel uses the NB-SILENT-FLUSH overrun method. This channel regularly overruns!*
9. Software/Documents Affected:  
SDAS User Intf version 2/18/97
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                                       |                      |
|---------------------------------------|----------------------|
| Cognizant Engineer: <u>JE Ellis</u>   | Date: <u>2/28/97</u> |
| Cognizant Manager: <u>John Samuel</u> | Date: <u>2/28/97</u> |
| CR/PR Preparer: <u>JE Ellis</u>       | Date: <u>2/28/97</u> |
| Design Authority: <u>JE Ellis</u>     | Date: <u>3/1/97</u>  |

## Change Request and Problem Report

CR/PR Number: 381. Software Id. (Name): SDAS User Interf. Rev: \_\_\_\_\_System Name: DDA Unit #12. Prepared by: JE Ellis / Ken Bennett Date: 1/26/973. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

Titler #2 new/replacement unit was installed and  
 does not work with the SDAS software

5. Submitter's Priority:  High  Medium  Low6. Change Authority: CR/Valid Date: 2/5/97  
 Accept  Modify  Reject  Defer Until:   /  /  7. Assigned to: JE Ellis8. Solution Comments Cost/Schedule Estimate:   /  

This was new hardware. Made the VI just the same  
 as Titler #1 and it all works fine now.

9. Software/Documents Affected:

SDAS User Intf version 2/18/97

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	<u>[Signature]</u>	Date:	<u>2/24/97</u>
Cognizant Manager:	<u>[Signature]</u>	Date:	<u>2/21/97</u>
CR/PR Preparer:	<u>[Signature]</u>	Date:	<u>2/28/97</u>
Design Authority:	<u>[Signature]</u>	Date:	<u>3/1/97</u>

## Change Request and Problem Report

- CR/PR Number: 39
1. Software Id. (Name): World Model Rev: \_\_\_\_\_  
 System Name: DVA Unit #1
2. Prepared by: JE Ellis Date: 1/27/97
3. CR/PR Type:  Change Request [ ] Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
Add model of tank AX-104 for deployment in  
FY 1997.
5. Submitter's Priority  High [ ] Medium [ ] Low
- 
6. Change Authority: SR Kuhl Date: 2/25/97  
 Accept [ ] Modify [ ] Reject [ ] Defer Until: 1/1/1
7. Assigned to: JE Ellis / J. Tucker
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_  
Added AX-104 model. Also increased the number  
of risers allowed from 20 to 40.
9. Software/Documents Affected:  
World model version 2/19/97  
~~SDAS user Manual WHE SD TD OMM -001~~ (no change needed)
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: ME S Date: 2/28/97  
 Cognizant Manager: W.D. Daniel Date: 2/28/97  
 CR/PR Preparer: JE Ellis Date: 2/28/97  
 Design Authority: SR Kuhl Date: 2/1/97

## Change Request and Problem Report

- Robot Pos C/S CR/PR Number: 40
1. Software Id. (Name): ~~World Model~~ Rev: \_\_\_\_\_  
System Name: LDVA Unit #1
2. Prepared by: JE Ellis Date: 1/27/97
3. CR/PR Type: [ ] Change Request [X] Problem Report  
Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
The robot position client/server software is difficult to use and is unreliable.
5. Submitter's Priority  High [ ] Medium [ ] Low
- 
6. Change Authority: Shelley Date: 2/25/97  
[X] Accept [ ] Modify [ ] Reject [ ] Defer Until: 1/1/1
7. Assigned to: JE Ellis
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_  
Replaced Sandia C++ code with simpler software. and integrated <sup>complex</sup> it into SDA's server
9. Software/Documents Affected:  
SDAS Server & drivers version 2/18/97  
Robot Position Client/Server is no longer a configuration item.  
SDAS User Manual WHC-SD-TD-OMM-001
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                                       |                      |
|---------------------------------------|----------------------|
| Cognizant Engineer: <u>JE Ellis</u>   | Date: <u>2/28/97</u> |
| Cognizant Manager: <u>John Samuel</u> | Date: <u>2/28/97</u> |
| CR/PR Preparer: <u>JE Ellis</u>       | Date: <u>2/18/97</u> |
| Design Authority: <u>John Samuel</u>  | Date: <u>3/11/97</u> |

→ Need to remove manuals from Configuration File.

746-1678

## Change Request and Problem Report

- CR/PR Number: 41
- Software Id. (Name): World Model Rev: \_\_\_\_\_  
System Name: LDUA Unit #1
  - Prepared by: JE Ellis Date: 1/27/97
  - CR/PR Type:  Change Request [ ] Problem Report  
Requested Completion Date: \_\_\_\_\_
  - Description & Justification if Change Request:  
Add the capability to read the LDUA Force Moment Sensor.
  - Submitter's Priority [ ] High  Medium [ ] Low
  - Change Authority: [Signature] Date: 2/25/97  
 Accept [ ] Modify [ ] Reject [ ] Defer Until:    /    /
  - Assigned to: JE Ellis / J. Ticker
  - Solution Comments Cost/Schedule Estimate:    /     
Wrote new software and integrated it with SDAS server & Drivers and World Model
  - Software/Documents Affected:  
SDAS Servers & Drivers version 2/18/97  
World Model version 2/19/97  
SDAS User Manual WHC-SD-TD-OMM-001
  - Approvals Indicate CR is Complete or PR is Resolved.  
Cognizant Engineer: [Signature] Date: 2/28/97  
Cognizant Manager: [Signature] Date: 2/28/97  
CR/PR Preparer: [Signature] Date: 2/28/97  
Design Authority: [Signature] Date: 2/27/97

## Change Request and Problem Report

- CR/PR Number: 42
1. Software Id. (Name): World Model Rev: \_\_\_\_\_  
 System Name: LDVA Unit #1
2. Prepared by: J E Ellis Date: 1/27/97
3. CR/PR Type:  Change Request  Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
 The ~~world~~ end effector change mechanism does not allow you to remove an end effector. It only allows you to replace one with another. Need option to say there is no end effector
5. Submitter's Priority  High  Medium  Low
- 
6. Change Authority: [Signature] Date: 2/25/97  
 Accept  Modify  Reject  Defer Until:  / /
7. Assigned to: J E Ellis / J. Tucker
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_  
 Done, modified GSL script.
9. Software/Documents Affected:  
 World Model version 2/19/97  
 SDAS User Man WHC-SB-TD-OMM-001
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                     |                    |       |                |
|---------------------|--------------------|-------|----------------|
| Cognizant Engineer: | <u>[Signature]</u> | Date: | <u>2/28/97</u> |
| Cognizant Manager:  | <u>[Signature]</u> | Date: | <u>2/28/97</u> |
| CR/PR Preparer:     | <u>[Signature]</u> | Date: | <u>2/28/97</u> |
| Design Authority:   | <u>[Signature]</u> | Date: | <u>3/3/97</u>  |

## Change Request and Problem Report

- CR/PR Number: 43
1. Software Id. (Name): World Model Rev: \_\_\_\_\_  
 System Name: #1/DVA Unit #1
2. Prepared by: J.E. Ellis Date: 1/17/97
3. CR/PR Type:  Change Request [ ] Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
 Since there is no way to remove a piece of  
 In-Tank Hardware, if you make any mistake,  
 you throw away everything you have done and  
 start over. The ability to delete IH is greatly needed
5. Submitter's Priority:  High [ ] Medium [ ] Low
- 
6. Change Authority: J.E. Ellis Date: 2/25/97  
 Accept [ ] Modify [ ] Reject [ ] Defer Until: 1 / 1 / \_\_\_\_\_
7. Assigned to: J.E. Ellis / J. Tucker
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_  
Modified Model to incorporate feature.
9. Software/Documents Affected:  
World Model version 2/19/97  
SDAS User Manual WHC-SD-TD-OMM-001
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                     |                   |       |                |
|---------------------|-------------------|-------|----------------|
| Cognizant Engineer: | <u>J.E. Ellis</u> | Date: | <u>2/28/97</u> |
| Cognizant Manager:  | <u>J. Tucker</u>  | Date: | <u>2/28/97</u> |
| CR/PR Preparer:     | <u>J.E. Ellis</u> | Date: | <u>2/28/97</u> |
| Design Authority:   | <u>J. Tucker</u>  | Date: | <u>3/1/97</u>  |

## Change Request and Problem Report

- CR/PR Number: 44
1. Software Id. (Name): World Model Rev: \_\_\_\_\_  
 System Name: LDUA Unit #1
2. Prepared by: J.E. Ellis Date: 1/27/97
3. CR/PR Type:  Change Request  Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
 The value you need to enter into the LDUA Console and the World Model for truck azimuth differ by  $180^\circ$
5. Submitter's Priority  High  Medium  Low
- 
6. Change Authority: S.H. Hill Date: 2/25/97  
 Accept  Modify  Reject  Defer Until: 1/1/1
7. Assigned to: J.E. Ellis / S. Tucker
8. Solution Comments Cost/Schedule Estimate: 1  
 Modified the ~~position~~<sup>frame of reference</sup> of the LDUA device in the World Model to match the Spar base coordinate system. Also changed the frame of reference for the end-effectors to match the Spar convention.
9. Software/Documents Affected:  
World Model version 2/19/97
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: J.E.E. Date: 2/28/97  
 Cognizant Manager: [Signature] Date: 2/28/97  
 CR/PR Preparer: J.E.E. Date: 2/28/97  
 Design Authority: [Signature] Date: 2/1/97



## Change Request and Problem Report

CR/PR Number: 451. Software Id. (Name): World Model Rev: \_\_\_\_\_System Name: LDUA Unit #12. Prepared by: JE Ellis Date: 1/27/973. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

Quite a bit of work ~~can~~ can go into setting up an LDUA configuration, but the World Model can only save the last configuration. It would be very helpful to allow the user to save multiple configurations and choose the desired one to load.

5. Submitter's Priority  High  Medium  Low6. Change Authority: Sh Will Date: 2/15/97  
 Accept  Modify  Reject  Defer Until: 1/1/17. Assigned to: JE Ellis / J. Tucker

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

Added the capability to save the configuration to a named file, and load it back again.

9. Software/Documents Affected:

World Model version 2/19/97  
SDAS UserMan WHC-SD-TD-0MM-001

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: JE EllisDate: 2/28/97Cognizant Manager: Tom SamvelDate: 2/28/97CR/PR Preparer: JE EllisDate: 2/28/97Design Authority: Sh WillDate: 3/1/97

## Change Request and Problem Report

- CR/PR Number: 46
1. Software Id. (Name): World Model Rev: \_\_\_\_\_  
 System Name: LDIA Unit #1
2. Prepared by: JE Ellis Date: 1/27/97
3. CR/PR Type:  Change Request [ ] Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
The real robot is not ~~in the collision~~ checked for collisions, only the simulated robot.
5. Submitter's Priority [ ] High [ ] Medium  Low
- 
6. Change Authority: JE Ellis Date: 2/25/97  
 [X] Accept [ ] Modify [ ] Reject [ ] Defer Until:  / /
7. Assigned to: JE Ellis / J. Tucker
8. Solution Comments Cost/Schedule Estimate:  /  
This was a performance issue. The MIPS 4400 CPU ~~is~~ not fast enough to do all the calculation required without impacting the graphics update rate. Since we upgraded to a MIPS 10,000 CPU, this is no longer a issue & the real robot is now checked also.
9. Software/Documents Affected:  
World Model version 2/19/97  
SDAS User Man WHC-SD-TD-OMM-001
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: JE Ellis Date: 2/28/97  
 Cognizant Manager: John Arnes Date: 2/28/97  
 CR/PR Preparer: JE Date: 2/28/97  
 Design Authority: JE Date: 3/3/97

## Change Request and Problem Report

- CR/PR Number: 47
1. Software Id. (Name): World Model Rev: \_\_\_\_\_  
 System Name: LDUA Unit #1
2. Prepared by: JE Ellis Date: 1/27/97
3. CR/PR Type: [ ] Change Request  Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
~~After the~~ After changing the orientation of the truck/VPM via the Local LDUA dialog, the collision checking no longer checks the In-Tank Hardware for collisions.
5. Submitter's Priority  High [ ] Medium [ ] Low
6. Change Authority: [Signature] Date: 2/5/97  
 Accept [ ] Modify [ ] Reject [ ] Defer Until:  / /
7. Assigned to: JE Ellis / J. Tucker
8. Solution Comments Cost/Schedule Estimate:  /  
 Modified Software to preserve the collision queue after changes in LDUA position.
9. Software/Documents Affected:  
World Model version 2/19/97
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                     |                    |       |                |
|---------------------|--------------------|-------|----------------|
| Cognizant Engineer: | <u>[Signature]</u> | Date: | <u>2/28/97</u> |
| Cognizant Manager:  | <u>[Signature]</u> | Date: | <u>2/28/97</u> |
| CR/PR Preparer:     | <u>[Signature]</u> | Date: | <u>2/28/97</u> |
| Design Authority:   | <u>[Signature]</u> | Date: | <u>3/1/97</u>  |

# Change Request and Problem Report

CR/PR Number: 48

1. Software Id. (Name): World Model Rev: \_\_\_\_\_

System Name: LDVA Unit #1

2. Prepared by: JE Ellis Date: 2/10/97

3. CR/PR Type:  Change Request [ ] Problem Report  
 Requested Completion Date: \_\_\_\_\_

4. Description & Justification if Change Request:  
Add a gripper and effector with long waste  
scrappers fingers to World Model

5. Submitter's Priority  High [ ] Medium [ ] Low

6. Change Authority: [Signature] Date: 2/25/97  
 Accept [ ] Modify [ ] Reject [ ] Defer Until: / /

7. Assigned to: JE Ellis / S. Tucker

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_  
Done.

9. Software/Documents Affected:  
World Model version 2/10/97

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: <u>[Signature]</u>	Date: <u>2/28/97</u>
Cognizant Manager: <u>[Signature]</u>	Date: <u>2/28/97</u>
CR/PR Preparer: <u>[Signature]</u>	Date: <u>2/28/97</u>
Design Authority: <u>[Signature]</u>	Date: <u>3/1/97</u>

## Change Request and Problem Report

CR/PR Number: 491. Software Id. (Name): SDAS User Intef Rev: \_\_\_\_\_System Name: LDWA Unit #12. Prepared by: J.E. Ellis Date: 2/10/973. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

HRSVS #2 VI hangs when various buttons are pushed & LV hangs.

5. Submitter's Priority  High  Medium  Low6. Change Authority: J.E. Ellis Date: 2/25/97  
 Accept  Modify  Reject  Defer Until:   /  /  7. Assigned to: J.E. Ellis8. Solution Comments Cost/Schedule Estimate:    /   

Corrected error in Opto22 drivers that took records offline when record generated busy record error. Now generates error, but does not go offline just returns OK-NODATA.

9. Software/Documents Affected:

SDAS Server & Drivers version 2/18/97

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: J.E. EllisDate: 2/28/97Cognizant Manager: J.E. EllisDate: 2/28/97CR/PR Preparer: J.E. EllisDate: 2/28/97Design Authority: J.E. EllisDate: 3/1/97

## Change Request and Problem Report

- CR/PR Number: 50
1. Software Id. (Name): World Model Rev: \_\_\_\_\_  
 System Name: LDVA Unit #1
2. Prepared by: JF Ellis / Dave Clark Date: 2/11/97
3. CR/PR Type: [ ] Change Request [X] Problem Report  
 Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
Added a piece of In-Tank Hardware and tried to collide with real robot. Collision was not detected
5. Submitter's Priority [X] High [ ] Medium [ ] Low
6. Change Authority: D. Skiff Date: 2/25/97  
 [X] Accept [ ] Modify [ ] Reject [ ] Defer Until:  / /
7. Assigned to: JE Ellis
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_  
Problem was traced to a lack of adding the Ith into the Robot collision queue. This was added in 4 macros that needed to access the collision queue, and the problem was solved.
9. Software/Documents Affected:  
World Model version 2/19/97
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                     |                   |       |                |
|---------------------|-------------------|-------|----------------|
| Cognizant Engineer: | <u>JF Ellis</u>   | Date: | <u>2/12/97</u> |
| Cognizant Manager:  | <u>Dave Clark</u> | Date: | <u>2/25/97</u> |
| CR/PR Preparer:     | <u>JF Ellis</u>   | Date: | <u>2/18/97</u> |
| Design Authority:   | <u>D. Skiff</u>   | Date: | <u>3/1/97</u>  |

## Change Request and Problem Report

CR/PR Number: 511. Software Id. (Name): World Model Rev: \_\_\_\_\_System Name: LDVA Unit #12. Prepared by: J E Ellis Date: 3/1/97

3. CR/PR Type: [ ] Change Request [X] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

The FMS force indicator turns red indicating that forces greater than 75# have been detected. Also FMS does not startup reliably. automatically

5. Submitter's Priority [X] High [ ] Medium [ ] Low

6. Change Authority: Spickard Date: 3/11/97  
[X] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_\_/\_\_\_/\_\_\_7. Assigned to: Lake Tucker8. Solution Comments Cost/Schedule Estimate: \_\_\_ / \_\_\_

The FMS is not a calibrated instrument. Removed the feature where the indicator turns red, by setting the joint limit to 1000# which can not be reached. Also, inserted FMS startup code in giscScript, so that it starts automatically

9. Software/Documents Affected:

SDAS User Manual UHC-SD-TD-OMM-001

SDAS Server &amp; Drivers version 3/10/97

World Model version 3/6/97

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: Edward EllisDate: 3/11/97Cognizant Manager: John DammDate: 3/11/97CR/PR Preparer: Edward EllisDate: 3/11/97Design Authority: SpickardDate: 3/1/97

## Change Request and Problem Report

CR/PR Number: 52

1. Software Id. (Name): SDAS Server & Drivers Rev:  
System Name: LDUA unit #1
2. Prepared by: J E Ellis Date: 3/11/97
3. CR/PR Type:  Change Request  Problem Report  
Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
Produce formal release of SDAS software. ~~showing~~  
= Integrate software into source code tree, generate  
changes  
binary from source tree, test to show correct operation  
and document new installation procedures.
5. Submitter's Priority  High  Medium  Low
- 
6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until:   /  /
7. Assigned to: J E Ellis
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_  
*Incorporated all changes from interim releases 2/18/97 &  
3/10/97. added further modifications and ran all through  
testing while installed on Unit #1. Automated distribution file  
production and target installation.*
9. Software/Documents Affected:  
SDAS Server & Drivers V 1.0.6  
SDAS User Intf V 1.0.6  
SCADAS OMM WHC-SD-TD-omm-001 Rev 2
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_  
Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_  
CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_  
Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_



## Change Request and Problem Report

CR/PR Number: 53

1. Software Id. (Name): SDAS Server & Drivers Rev: \_\_\_\_\_  
System Name: L DUA Unit #1
2. Prepared by: JE Ellis Date: 3/11/97
3. CR/PR Type:  Change Request [ ] Problem Report  
Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
Modify SDAS VME crate & L DUA system crate  
to have SDAS CPU & GISC CPU boot from Flash RAM  
like the Spar CPU does.
5. Submitter's Priority [ ] High [ ] Medium  Low
- 
6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until:  / /
7. Assigned to: \_\_\_\_\_
8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_
9. Software/Documents Affected:
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_  
Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_  
CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_  
Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

- CR/PR Number: 50
1. Software Id. (Name): World Model Rev: \_\_\_\_\_  
 System Name: \_\_\_\_\_
2. Prepared by: Jake Tucker/Dave Clark Date: 4/3/97
3. CR/PR Type:  Change Request  Problem Report  
 Requested Completion Date: 4/3/97
4. Description & Justification if Change Request:  
 Remove simulated AX104 ALCS from Cold test facility mod  
 -in- life Circulators
5. Submitter's Priority  High  Medium  Low
6. Change Authority: St. Hill Date: 4/3/97  
 Accept  Modify  Reject  Defer Until:   /  /
7. Assigned to: Jake Tucker
8. Solution Comments Cost/Schedule Estimate: \$10 / 5 min  
 Removed the offending items as required.
9. Software/Documents Affected:  
None
10. Approvals Indicate CR is Complete or PR is Resolved.
- |                     |                       |       |               |
|---------------------|-----------------------|-------|---------------|
| Cognizant Engineer: | <u>Edward G. Hill</u> | Date: | <u>4/3/97</u> |
| Cognizant Manager:  | <u>Tom Vance</u>      | Date: | <u>4/3/97</u> |
| CR/PR Preparer:     | <u>D. Hill</u>        | Date: | <u>4/3/97</u> |
| Design Authority:   | <u>St. Hill</u>       | Date: | <u>4/3/97</u> |

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## Change Request and Problem Report

CR/PR Number: 551. Software Id. (Name): SDAS User Interface Rev: 1.0.6System Name: OMM unit #12. Prepared by: Todd Ervine Date: 7/15/983. CR/PR Type:  Change Request [ ] Problem ReportRequested Completion Date: 9/30/97

4. Description &amp; Justification if Change Request:

Customer wishes to add a new end effector

F:

5. Submitter's Priority  High [ ] Medium [ ] Low6. Change Authority: Todd Ervine Date: 3/18/98 Accept [ ] Modify [ ] Reject [ ] Defer Until: 1/17. Assigned to: JE Ellis8. Solution Comments Cost/Schedule Estimate: 74K / 170 hrsadded ERET control panel & updated documentation.

9. Software/Documents Affected:

SDAS User Interface SW version 1.0.7  
OMM rev 1

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: Todd ErvineDate: 3/25/98Cognizant Manager: Todd ErvineDate: 7/18/98CR/PR Preparer: Todd ErvineDate: 7/18/98Design Authority: Todd ErvineDate: 3/24/98

TECHNICAL LEAD

# Change Request and Problem Report

CR/PR Number: 56

1. Software Id. (Name): World Model Rev: \_\_\_\_\_

System Name: LDUA unit #1

2. Prepared by: Todd Samuel Date: 2/10/98

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: 3/1/98

4. Description & Justification if Change Request:  
Need to add model of EREE to world model

5. Submitter's Priority  High  Medium  Low

6. Change Authority: TODD SAMUEL Date: 2/10/98  
 Accept  Modify  Reject  Defer Until:   /  /  

7. Assigned to: J. Tucker

8. Solution Comments Cost/Schedule Estimate: 7.3K / 4hrs  
(see back)

9. Software/Documents Affected:  
~~the~~ World Model SW version

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	<u>[Signature]</u>	Date:	<u>3/25/98</u>
Cognizant Manager:	<u>[Signature]</u>	Date:	<u>3/11/98</u>
CR/PR Preparer:	<u>[Signature]</u>	Date:	<u>3/18/98</u>
Design Authority:	<u>[Signature]</u>	Date:	<u>3/24/98</u>

TECHNICAL LEAD

## Change Request and Problem Report

- CR/PR Number: 57
1. Software Id. (Name): SDAS (headoff) Rev: 1.0.6  
System Name: LDUA unit #1
2. Prepared by: Todd Samuel Date: 3/5/98
3. CR/PR Type: [ ] Change Request [X] Problem Report  
Requested Completion Date: 3/10/98
4. Description & Justification if Change Request:  
During operations training SDAS crashes very frequently. Please try to make SDAS more reliable.
5. Submitter's Priority [X] High [ ] Medium [ ] Low
6. Change Authority: Todd Samuel Date: 3/5/98  
[X] Accept [ ] Modify [ ] Reject [ ] Defer Until: 1/1/
7. Assigned to: JE Ellis
8. Solution Comments Cost/Schedule Estimate: \$3K / 30 hrs  
Divided SDAS User Intf into Top SDAS & Video SDAS components. This enhanced reliability some. System still crashes. Recommend further study and troubleshooting. (see CRPR #61). Updated Documentation.
9. Software/Documents Affected:  
SDAS User Interf SW version 1.0.7  
OMM rev 1
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: Edward Ellis Date: 3/25/98  
Cognizant Manager: Todd Samuel Date: 3/19/98  
CR/PR Preparer: Todd Samuel Date: 3/5/98  
Design Authority: JE Ellis Date: 3/14/98  
TECHNICAL LEAD

## Change Request and Problem Report

- CR/PR Number: 58
1. Software Id. (Name): SDAS User Intf Rev: 1.0.6  
 System Name: LDUA unit #11
2. Prepared by: Todd Samuel Date: \_\_\_\_\_
3. CR/PR Type: [ ] Change Request [X] Problem Report  
 Requested Completion Date: 3/19/98
4. Description & Justification if Change Request:  
 When EREE control panel is <sup>used</sup> closed and reopened,  
 the scoops open and dump the sample. Please make  
 the jaws remain where last commanded.
5. Submitter's Priority [X] High [ ] Medium [ ] Low
6. Change Authority: Todd Samuel Date: 3/5/98  
 [X] Accept [ ] Modify [ ] Reject [ ] Defer Until: 1 / 1 / \_\_\_\_\_
7. Assigned to: J E Ellis
8. Solution Comments Cost/Schedule Estimate: .4k / 4ms  
 Made change to VI. Controls behave correctly.
9. Software/Documents Affected:  
SDAS User Intf SW version 1.0.7
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: [Signature] Date: 3/25/98  
 Cognizant Manager: [Signature] Date: 3/19/98  
 CR/PR Preparer: Todd Samuel Date: 3/5/98  
 Design Authority: [Signature] Date: 3/24/98  
 TECHNICAL LEAD

## Change Request and Problem Report

CR/PR Number: 59

1. Software Id. (Name): SDAS Server Rev: 1.0.6  
 System Name: L DUA unix #1
2. Prepared by: Todd Samuel Date: 3/5/98
3. CR/PR Type:  Change Request [ ] Problem Report  
 Requested Completion Date: 3/19/98
4. Description & Justification if Change Request:  
SDAS errors report a time that is off by 1 hour  
from wall clock time.

5 Submitter's Priority  High [ ] Medium [ ] Low6. Change Authority: Todd Samuel Date: 3/5/98  
 Accept [ ] Modify [ ] Reject [ ] Defer Until: 1/1/17. Assigned to: J.E. Ellis8. Solution Comments Cost/Schedule Estimate: 7.4K / 4 hrs

Current implementation was to set the time zone information by hand. Modifying SDAS boot file (a configuration change). Changed TIME RPC code to get Time zone info from linux and set it automatically. updated documentation.

9. Software/Documents Affected:

SDAS Server SW version 1.0.7  
 SDAS Console SW version 1.0.7  
 OMM rev 1

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: J.E. Ellis Date: 3/25/98  
 Cognizant Manager: Todd Samuel Date: 3/19/98  
 CR/PR Preparer: Todd Samuel Date: 3/16/98  
 Design Authority: J.E. Ellis Date: 3/24/98

TECHNICAL LEAD

## Change Request and Problem Report

- CR/PR Number: 60
1. Software Id. (Name): SDAS User drift. Rev: 1.0.6  
System Name: LDWA unit #1
2. Prepared by: Todd Samuel Date: 3/5/98
3. CR/PR Type:  Change Request  Problem Report  
Requested Completion Date: 3/19/98
4. Description & Justification if Change Request:  
Want titler to only put text out when titler VI is  
= open. Want text cleared from screen when VI is  
closed.
5. Submitter's Priority  High  Medium  Low
6. Change Authority: Todd Samuel Date: 3/5/98  
 Accept  Modify  Reject  Defer Until:  / /
7. Assigned to: J.E. Ellis
8. Solution Comments Cost/Schedule Estimate: \$4K / 4 hrs  
Modified VI. Behaves as desired now.
9. Software/Documents Affected:  
SDAS User drift SW version 1.0.7
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: J. Ellis Date: 3/25/98  
Cognizant Manager: Todd Samuel Date: 3/20/98  
CR/PR Preparer: Todd Samuel Date: 3/16/98  
Design Authority: J. Ellis Date: 3/24/98
- TECHNICAL LEAD



## Change Request and Problem Report

- CR/PR Number: 61
1. Software Id. (Name): SDAS User Interface Rev: 1.0.7  
System Name: LDUA unit #1
2. Prepared by: J E Ellis / Todd Samuel Date: 3/20/98
3. CR/PR Type:  Change Request  Problem Report  
Requested Completion Date: \_\_\_\_\_
4. Description & Justification if Change Request:  
*During operations SDAS crashes occasionally.  
= (SEE CRPR #57) This problem (57) was never fully resolved  
and needs further analysis.*
5. Submitter's Priority  High  Medium  Low
- 
6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until:   /  /
7. Assigned to: \_\_\_\_\_
8. Solution Comments Cost/Schedule Estimate: \$4K / 1 week
9. Software/Documents Affected:
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_  
Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_  
CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_  
Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

- CR/PR Number: 62
1. Software Id. (Name): SDAS User Intf Rev: 1.0.6  
System Name: LDUA unit #1
2. Prepared by: J.E. Ellis / K.L. Bennett Date: 3/24/98
3. CR/PR Type: [ ] Change Request [X] Problem Report  
Requested Completion Date: 3/24/98
4. Description & Justification if Change Request:  
When SDAS gets robot ~~pos~~ position data indicating "NO END EFFECTOR" it does not always clear the currently mounted ENDEFFECTOR Button. This causes confusion about the true state of the system
5. Submitter's Priority [X] High [ ] Medium [ ] Low
6. Change Authority: Endo Dransoff Date: 3/25/98  
[X] Accept [ ] Modify [ ] Reject [ ] Defer Until:  / /
7. Assigned to: J.E. Ellis
8. Solution Comments Cost/Schedule Estimate: 3K 1 4ms  
Software assumed that the button was blank whenever the control panel was started. In fact it is only blank the first time started. Software now correctly blanks the button
9. Software/Documents Affected:  
SDAS User Intf SW version 1.0.7
10. Approvals Indicate CR is Complete or PR is Resolved.
- Cognizant Engineer: Edward Ellis Date: 3/25/98  
Cognizant Manager: Endo Dransoff Date: 3/25/98  
CR/PR Preparer: Edward Ellis Date: 3/25/98  
Design Authority: J.E. Ellis Date: 3/25/98
- TECHNICAL LEAD: J.E. Ellis

## Change Request and Problem Report

CR/PR Number: \_\_\_\_\_

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

---

5. Submitter's Priority  High  Medium  Low

6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_

 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: \_\_\_\_\_

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: \_\_\_\_\_

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: \_\_\_\_\_

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

# Change Request and Problem Report

CR/PR Number: \_\_\_\_\_

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description & Justification if Change Request:

5. Submitter's Priority  High  Medium  Low

6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer: \_\_\_\_\_ Date: \_\_\_\_\_

Cognizant Manager: \_\_\_\_\_ Date: \_\_\_\_\_

CR/PR Preparer: \_\_\_\_\_ Date: \_\_\_\_\_

Design Authority: \_\_\_\_\_ Date: \_\_\_\_\_

## Change Request and Problem Report

CR/PR Number: \_\_\_\_\_

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

5.

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____



## Change Request and Problem Report

CR/PR Number: \_\_\_\_\_

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

5. Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: \_\_\_\_\_

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type:  Change Request  Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

5 Submitter's Priority  High  Medium  Low6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
 Accept  Modify  Reject  Defer Until: \_\_\_/\_\_\_/\_\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____

## Change Request and Problem Report

CR/PR Number: \_\_\_\_\_

1. Software Id. (Name): \_\_\_\_\_ Rev: \_\_\_\_\_

System Name: \_\_\_\_\_

2. Prepared by: \_\_\_\_\_ Date: \_\_\_\_\_

3. CR/PR Type: [ ] Change Request [ ] Problem Report

Requested Completion Date: \_\_\_\_\_

4. Description &amp; Justification if Change Request:

5. Submitter's Priority [ ] High [ ] Medium [ ] Low

6. Change Authority: \_\_\_\_\_ Date: \_\_\_\_\_  
[ ] Accept [ ] Modify [ ] Reject [ ] Defer Until: \_\_/\_\_/\_\_

7. Assigned to: \_\_\_\_\_

8. Solution Comments Cost/Schedule Estimate: \_\_\_\_\_ / \_\_\_\_\_

9. Software/Documents Affected:

10. Approvals Indicate CR is Complete or PR is Resolved.

Cognizant Engineer:	_____	Date:	_____
Cognizant Manager:	_____	Date:	_____
CR/PR Preparer:	_____	Date:	_____
Design Authority:	_____	Date:	_____