

**EVLA  
SP4T Switch**

**STATEMENT OF WORK**

**A23010N0007**

Version: A  
Status: Draft  
2011-08-19

<b>Prepared By:</b>	<b>Organization</b>	<b>Date</b>
Chip Scott	NRAO	2011-08-19
<b>IPT Leader Approval:</b>		
<b>Systems Engineering Approval:</b>		

<b>EVLA</b> <b>SP4T Switch</b>  <b>STATEMENT OF WORK</b>	Doc#: A23010N0007 Date: 2011-08-19 Page 2 of 9
---	--

### Change Record

<b>Version</b>	<b>Date</b>	<b>Affected Section(s)</b>	<b>Change Request #</b>	<b>Reason/Initiation/Remarks</b>
A	2011-08-19	All		First Draft

<b>EVLA</b> <b>SP4T Switch</b>  <b>STATEMENT OF WORK</b>	Doc#: A23010N0007 Date: 2011-08-19 Page 3 of 9
---	--

**Table of Contents**

- 1 INTRODUCTION ..... 4**
- 2 SCOPE ..... 4**
- 3 RELATED DOCUMENTS ..... 4**
- 3.1 Applicable Documents..... 4
- 4 REQUIREMENTS ..... 4**
- 4.1 Project Management ..... 4
  - 4.1.1 Project Reporting ..... 4
  - 4.1.2 Progress Meetings ..... 5
  - 4.1.3 Change Request Procedure ..... 5
- 4.2 Product Requirements ..... 5
- 4.3 Quantities and Delivery Schedule ..... 5
- 4.4 Quality Assurance ..... 6
  - 4.4.1 QA Procedures ..... 6
  - 4.4.2 Inspections ..... 6
  - 4.4.3 Calibration and Metrology ..... 6
- 4.5 Verification of Requirements ..... 7
  - 4.5.1 Screening Test..... 7
  - 4.5.2 Screening Test Results ..... 7
  - 4.5.3 Non-compliant Test Results..... 7
  - 4.5.4 Manufacturing Requirements..... 7
- 4.6 Finished Part Marking..... 8
- 4.7 Shipping, Handling and Storage ..... 8
  - 4.7.1 Shipping Container Marking..... 8
  - 4.7.2 Shipping Address ..... 8
  - 4.7.3 Electrostatic Protection ..... 9
  - 4.7.4 Packaging..... 9
- 4.8 Warranty..... 9

<b>EVLA SP4T Switch</b>  <b>STATEMENT OF WORK</b>	Doc#: A23010N0007 Date: 2011-08-19 Page 4 of 9
---	--

## 1 Introduction

This document details the Statement of Work (SOW) requirements for the procurement of microwave SP4T Switches to be used in the EVLA Antennae Receiver Cabins.

## 2 Scope

This SOW covers the design, manufacture and delivery of Single-Pole Four-Throw (SP4T) Switches. The design specifications are defined in the SP4T Switch Specification.

## 3 Related Documents

### 3.1 Applicable Documents

The following documents are a part of this document to the extent specified herein. If not explicitly stated differently, the latest issue of the document is valid.

Reference	Document Title	Document ID
[AD 01]	EVLA Switch Specification (dated 8-19-2011, Rev. A)	A23010N0006

## 4 Requirements

### 4.1 Project Management

The chosen Vendor shall identify a project manager who has authority over the involved personnel and resources. In case of administrative, financial and contractual matters, the project manager shall communicate with the NRAO contracting officer with a copy to the NRAO technical representative. In the case of purely technical information exchanges and after the purchase order is awarded, the Vendor and its staff may directly contact the NRAO technical staff.

The Vendor shall not act on any change in the direction or scope of the contract unless specifically directed to do so via written instructions from the NRAO contracting officer.

#### 4.1.1 Project Reporting

For the duration of the contract, the Vendor shall provide the NRAO with a status report approved and signed by the project manager when the following events occur:

- Completion of SP4T Switch design (including the outline drawing);

<b>EVLA SP4T Switch  STATEMENT OF WORK</b>	Doc#: A23010N0007 Date: 2011-08-19 Page 5 of 9
--	--

- Completion of the screen testing of the first lot, and
- Completion of the delivery of 1/2 the total quantity ordered.

The status reports shall be brief, summarize the current status of the work, describe the activities that have occurred since the previous status report or the start of the contract and identify any known problems that could impact the delivery date or performance of any of the remaining SP4T Switches.

The status reports shall be sent to the NRAO technical representative and copied to the NRAO contract officer. E-mail status reports are acceptable.

#### **4.1.2 Progress Meetings**

The NRAO and the Vendor shall both be able to call for a progress meeting at the Vendor's premises or via teleconference. When a progress meeting is called, the requesting party shall provide an agenda and compile the minutes of the meeting. A list of participants shall be agreed at least three days before the meeting. The meeting minutes shall be distributed one day after the meeting.

Any action items generated, direction given by the NRAO, or changes requested by the Vendor shall be documented in the meeting minutes and distributed to all participants.

#### **4.1.3 Change Request Procedure**

If NRAO requests a change that affects any of the contractual conditions, the Vendor shall return a reasonable and justified change proposal within 2 weeks, and if approved by NRAO, implement the requested change. In the case of a change request initiated by the Vendor, the NRAO shall decide and reply to such a request within 2 weeks.

In either case, the NRAO and the Vendor have no obligation to accept the proposed change and the implementation of the change request shall not start prior to a written authorization by the NRAO and a written agreement by the Vendor.

#### **4.2 Product Requirements**

The electrical and mechanical specifications for the SP4T Switches are defined in reference [AD 01].

#### **4.3 Quantities and Delivery Schedule**

The vendor shall adhere to the following:

Deliverable Quantity: 320

Delivery Schedule:

<b>EVLA SP4T Switch  STATEMENT OF WORK</b>	Doc#: A23010N0007 Date: 2011-08-19 Page 6 of 9
--	--

- The First Lot of twelve switches on or before 14 weeks (TBR pending screening review) After Receipt of Order (ARO)
- Sixty units on or before 20 weeks ARO
- A minimum of Thirty Three (33) Switches per month starting 24 weeks ARO to completion.

Early delivery of any or all of the 320 switches is acceptable as long as the above delivery schedule is met and only after NRAO formal acceptance of the First Lot.

#### **4.4 Quality Assurance**

The following subsections detail the Quality Assurance (QA) requirements applicable to the design, manufacture, test and delivery of the Switches.

##### **4.4.1 QA Procedures**

The Vendor shall provide evidence of the documented Quality Assurance program they have implemented. If the QA program has been verified by an independent auditing organization, a certificate of compliance is sufficient.

Otherwise, the Vendor shall make available for review their internal written procedures which define the processes used to ensure quality product. These written procedures developed by the Vendor for implementing the requirements of this specification shall be subject to review and approval by NRAO.

##### **4.4.2 Inspections**

NRAO reserves the right to perform the necessary inspections, verifications and evaluations deemed necessary to determine the supplier's conformance to these requirements. All work and tests performed as part of this procurement are subject to inspection by NRAO. If requested, the Vendor shall make available to NRAO and their representatives all applicable drawings, specifications, and changes thereto, and such other information necessary to perform quality assurance functions.

##### **4.4.3 Calibration and Metrology**

The Vendor shall ensure that all test equipment used to verify performance specifications shall be calibrated. The calibration shall be traceable to a certified reference such as an industry standards laboratory or a government laboratory. For instances where such a calibration standards do not exist, the calibration of the vendor instruments shall be established to the satisfaction of NRAO personnel through mutual discussion.

<b>EVLA SP4T Switch  STATEMENT OF WORK</b>	Doc#: A23010N0007 Date: 2011-08-19 Page 7 of 9
--	--

NRAO personnel shall be permitted to observe the manufacturing process and witness the screen testing of the Switches.

#### **4.5 Verification of Requirements**

The Vendor shall provide NRAO with a proposed verification matrix which identifies each requirement identified in AD1 and the method that the Vendor shall use to verify compliance. The standard verification methods are: Analysis, Review of design, Simulation and Test.

NRAO and the Vendor shall reach a mutual agreement on the methods applied in the verification matrix prior to the start of screen testing.

##### **4.5.1 Screening Test**

The vendor shall propose a screening test designed to maximize the reliability of the switches. The screening test shall weed out a very high percentage of infant mortality failures while at the same time not adversely affecting the life of the switch.

The Vendor shall provide NRAO with screening test procedure at least 5 working days prior to the start of any screen testing. NRAO will respond within 5 working days with any questions concerning the effectiveness or accuracy of the proposed test procedure or configuration. All questions submitted by NRAO shall be resolved to a mutual agreement prior to the start of screen testing.

##### **4.5.2 Screening Test Results**

Screening test data shall accompany each delivered lot in electronic form (in a mutually agreed upon format between NRAO and the Vendor). Test data shall include date, operator name, model, serial number and latest calibration date of all test equipment used.

##### **4.5.3 Non-compliant Test Results**

If any screening test results indicate a non-compliance with the product specifications as defined in reference [AD1], a status meeting shall be requested by the Vendor with NRAO within 24 hours.

NRAO and the Vendor shall then negotiate a mutually agreeable resolution to this event. NRAO will provide written direction, via the NRAO contracting officer, as to what action(s) the Vendor should take.

##### **4.5.4 Manufacturing Requirements**

The Vendor has the full responsibility for the subcontracting of any manufacturing, packaging, and testing required for the production of the Switches.

<b>EVLA SP4T Switch</b>  <b>STATEMENT OF WORK</b>	Doc#: A23010N0007 Date: 2011-08-19 Page 8 of 9
---	--

#### **4.6 Finished Part Marking**

The finished parts shall be marked with the following information:

- Vendor's name
- Vendor's part number including applicable revision letter
- Serial Number
- Manufacture date code

The Vendor shall use a permanent marking method for labeling the devices. The marking method and location shall be identical for all devices.

#### **4.7 Shipping, Handling and Storage**

The shipping shall be FOB Socorro, New Mexico.

The Vendor's standard practices which ensure the timely, undamaged, and uncontaminated shipment of deliverable items are acceptable. The Vendor's standard practices shall provide for commercial shipment of repair and/or replacement units.

##### **4.7.1 Shipping Container Marking**

In addition to the special marking specified by the contract or purchase order, the shipping containers shall be marked on the outside surface with the following information:

- EVLA Switches;
- NRAO P.O.# xxxx;
- Quantity;
- Ship date;
- Name, address, phone number of sender and recipient, and
- Special handling and unpacking instructions (if any).

This marking information shall be permanent, legible and protected against wear.

##### **4.7.2 Shipping Address**

Completed parts shall be shipped to:

PO Number: XXXXX (replace Xs with actual PO number)  
National Radio Astronomy Observatory  
Array Operations Center / ALMA  
1003 Lopezville Road



<b>EVLA SP4T Switch  STATEMENT OF WORK</b>	Doc#: A23010N0007 Date: 2011-08-19 Page 9 of 9
--	--

Socorro, NM 87801-0387

#### **4.7.3 Electrostatic Protection**

Electrostatic protection shall be sufficient and appropriate to ensure the units are protected against damage during handling and shipment to NRAO.

#### **4.7.4 Packaging**

The devices shall be packaged using appropriate and sufficient materials to prevent damage during handling and shipment to the NRAO.

#### **4.8 Warranty**

The Vendor shall guarantee the Switches for a period of 1 year after acceptance by the NRAO. This guarantee shall cover all defects due to defects in design, material, manufacturing and material handling.