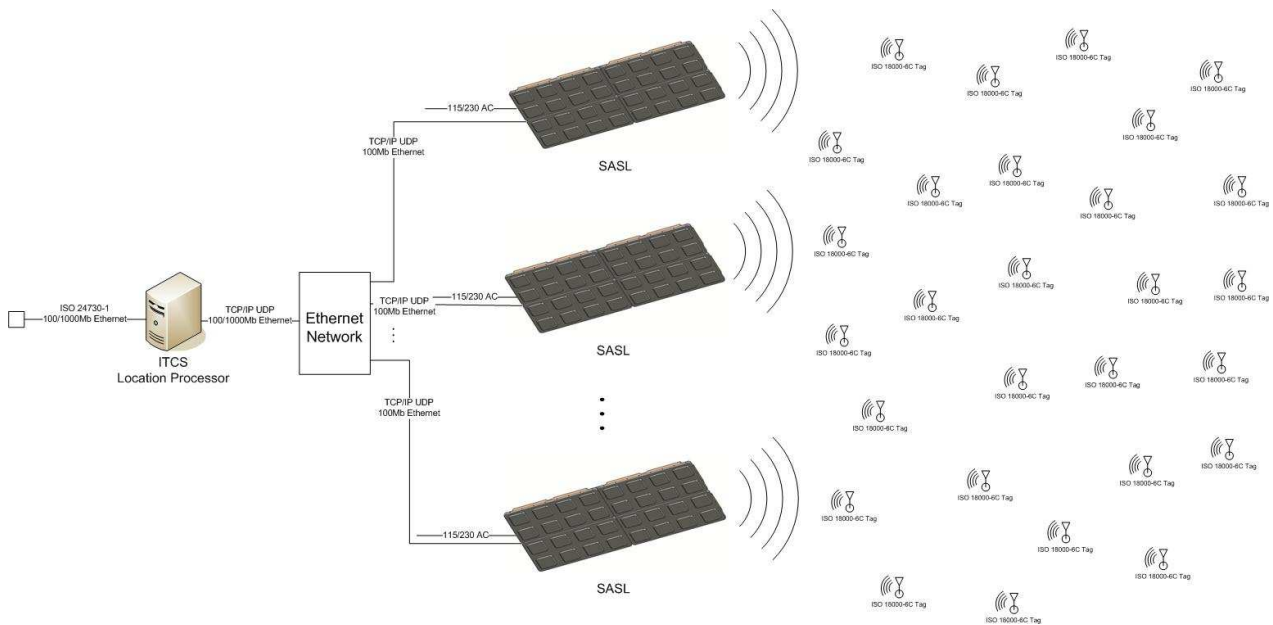


# RF CONTROLS

IDENTIFY. LOCATE. TRACK.™

## User Guide SASL™ (Signal Acquisition & Source Location unit)



### RF Controls Intelligent Tracking and Control System (ITCS™)

#### ITCS-A-1xx family Models

ITCS-A-100  
ITCS-A-102  
ITCS-A-104

# Introduction

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This **SASL™ User Guide** provides the basic information needed to install and set up an individual **SASL** antenna unit. This guide is not intended to provide instructions for installing, configuring and calibrating the RF Controls Intelligent Tracking and Control System (**ITCS™**). Detailed instructions are provided in the **Technical Manual** (ITCS-A-100-002) and **Programmer's Reference Guide** (ITCS-A-100-003).

## INTENDED AUDIENCE

This guide is intended for those who will install and set up the RF Controls **SASL** (Signal Acquisition and Source Location) unit. Before attempting to install, configure and operate this product, you should be familiar with the following:

- Windows based software installation and operation
- Device communication parameters including Ethernet and serial communications
- RFID reader configuration including antenna placement and RF Parameters
- Electrical and RF safety procedures.

## CONTENTS

1. SASL overview
2. Installation
3. Software
4. Specifications
5. Safety instructions

## FCC NOTICE

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## CONTACT INFORMATION

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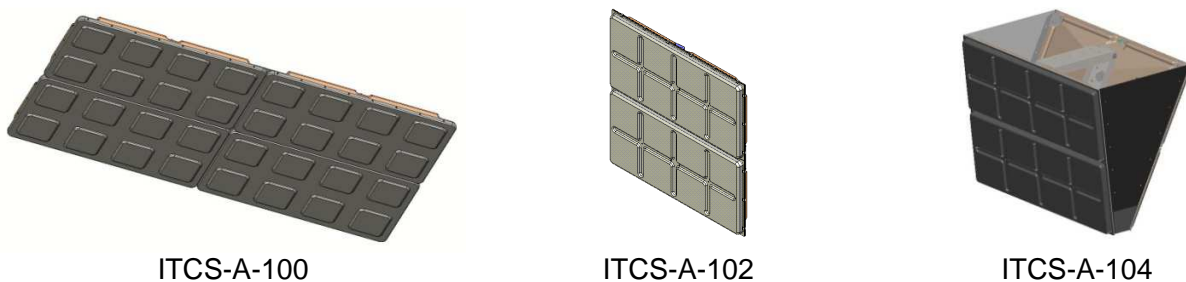
# SASL OVERVIEW

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**SASL** is a multi-protocol, multi-regional Radio Frequency Signal Acquisition & Source Location unit, which is used to Identify and locate RFID tags operating in the UHF 860 – 960 MHz frequency band. A number of **SASL** units may be used together with an **ITCS** Location Processor to form an Intelligent Tracking and Control System (**ITCS**). **SASL** comprises an embedded multi-protocol, multi-regional RFID reader/writer transceiver connected to the patented steerable phased array antenna system. **SASL** is designed to operate from AC mains power and communicates with a host computer using standard Ethernet TCP/IP and UDP protocol. Figure 1 illustrates the three versions of SASL currently available. All three versions are equipped with identical RFID reader and Array Controller.

- ITCS-A-100 is constructed using four Bi-directional Electronically Steerable Phased Arrays (**BESPA™**) arranged to provide a single array with a circularly polarized gain of 8.6dBi.
- ITCS-A-102 is constructed using two **BESPA**s arranged to provide a single array with a circularly polarized gain of 7.5dBi.
- ITCS-A-104 is constructed from two pairs of **BESPA**s in the form of a 'V', each having a circularly polarized gain of 7.5dBi. The arrays are mounted back to back so as to illuminate a volume in opposite directions. The two arrays are fed from a single reader/writer and an Array Controller, multiplexed so that opposite directions are alternately scanned. The multiplexing of the separate arrays occurs at a sufficiently fast rate so to be indiscernible to the user.

The particular units used in an installation will depend on the system design and determined by a qualified applications engineer. For example, an ITCS-A-104 would typically be ceiling mounted in the middle of a warehouse to extend the coverage of an ITCS system in two directions. The three models may be intermixed as required in a single ITCS system.



**Figure 1**  
**SASL (Signal Acquisition and Source Location) units**

## INDICATOR LIGHTS

### Reader Indicator Lights

There are four lights on the back of the **SASL** located on the **SIRIT** RFID reader.

The indicator lights on the SIRIT RFID reader are:

- **Sense** – Indicates that the reader has detected a tag in the RF field
- **Transmit** – indicates that the reader/writer transmitter is operating (RF on)
- **Fault** – Indicates that there is a fault
- **Power** – Indicates that power is applied to the reader

Note that when the SIRIT reader is performing power on auto-test, the indicator lights will flash momentarily.



**Figure 2**  
**SIRIT RFID Reader Indicator Lights.**

### Array Controller Indicator Lights

There are two indicator lights on the Array Controller used to indicate the health of the system. These are

- **Status** – The flash repetition rate indicates the status of the Array Controller. See the **SASL Technical Manual** for further information
- **Power** – Indicates that the power supply is on and healthy.



**Figure 3**  
**Array Controller Indicator Lights**

# Installation

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## MECHANICAL INSTALLATION

Each model of the ITCS-A-1xx family of SASL units is mounted slightly differently. **SASL** units weigh up to 85 lbs (38.5kg), so it is important to ensure that the structure, to which the **SASL** is to be attached, is of sufficient strength. The **SASL** may be ceiling mounted, wall mounted or attached to a suitable stand. When ceiling mounted, a safety cable must be secured to a separate ceiling fixture and attached to the **SASL** mounting bracket.

When mounting the **SASL** as a stand-alone unit, make sure that it is mounted the correct way up as indicated by information in the **Technical Manual**, for the specific **SASL**. If the **SASL** is one of several and is part of an **ITCS** network, then orient each **SASL** according to the **ITCS** system installation drawings. If in doubt contact a member of our technical support team.

### ITCS-A-100

The ITCS-A-100 **SASL** is provided in its standard configuration with a mounting bracket for installation in a landscape orientation. An optional portrait mounting bracket is available if under special circumstances an installation configuration requires the **SASL** to be installed in portrait orientation. When mounting the **SASL**, the SIRIT RFID reader should be below the mounting tube as shown in figure 5, to ensure that the center of gravity is below the axis of the mounting tube. Consult the **Technical Manual**, for further information. Contact a member of our technical support team for more information.

### ITCS-A-102

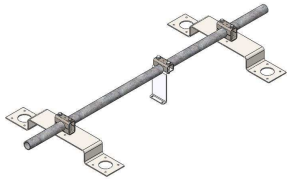
The ITCS-A-102 **SASL** is only mounted in a landscape orientation because the array is symmetrical there is no benefit to mounting the array in a portrait fashion. When mounting the **SASL**, the SIRIT RFID reader should be below the mounting tube as shown in figure 6, to ensure that the center of gravity is below the axis of the mounting tube. Consult the **Technical Manual**, for further information. Contact a member of our technical support team for more information.

### ITCS-A-104

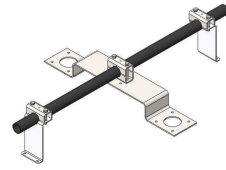
The ITCS-A-104 **SASL** is designed to be mounted by hanging the array from above as shown in figure 1. The **SASL** must be stabilized to ensure that the unit does not move once mounted. Consult the **Technical Manual**, for further information. Contact a member of our technical support team for more information.

The **SASL** mounting bracket incorporates a mounting tube which is designed to be attached to industry standard “**UNISTRUT**®” industrial framing systems. (See: [www.unistrut.com](http://www.unistrut.com) for more information). Figure 4 shows the ITCS-A-100 and ITCS-A-102 mounting brackets. The ITCS-A-104 mounting is similar and uses the same “**UNISTRUT**” hardware.

When mounting the **SASL** as a stand-alone unit, make sure that it is mounted the correct way up as indicated by information in the **Technical Manual**, for the specific **SASL**. If the **SASL** is one of several and is part of an **ITCS** network, then orientate each **SASL** according to the **ITCS** system installation drawings. If in doubt contact a member of our technical support team.



**ITCS-A-100 Bracket**



**ITCS-A-102 Bracket**

**Figure 4**  
**ITCS-A-1xx Mounting Brackets**

### **SAFETY WARNING**

The ITCS-A-100 and ITCS-A-104 **SASL** weigh approximately 75 to 85 lbs (34- 38kg), and ITCS-A-102 weighs approximately 50 lbs (23kg). These units should only be installed using suitable safety and lifting equipment. Ensure that the wall fixings or mounting hardware is suitably rated.

## ELECTRICAL INSTALLATION

Electrical installation requires the connection of two plugs.

### AC Mains Input

AC mains input is provided on an IEC connector on the power supply module as shown in figure 5. Connect the provided IEC mains cord to the power supply and plug it in to a suitable mains outlet. Note that the mains outlet must be located in close proximity to the **SASL** and must be accessible to enable easy disconnection of the mains supply to the **SASL** in case of emergency or when servicing.

### Ethernet

The Ethernet LAN connection uses the industry standard RJ-45 connector. A suitable Ethernet cable fitted with an RJ-45 plug is connected to the **SASL** RAID processor box as shown in figure 5. The **SASL** is factory programmed with a fixed IP address which is shown on the label adjacent to the Ethernet connector.

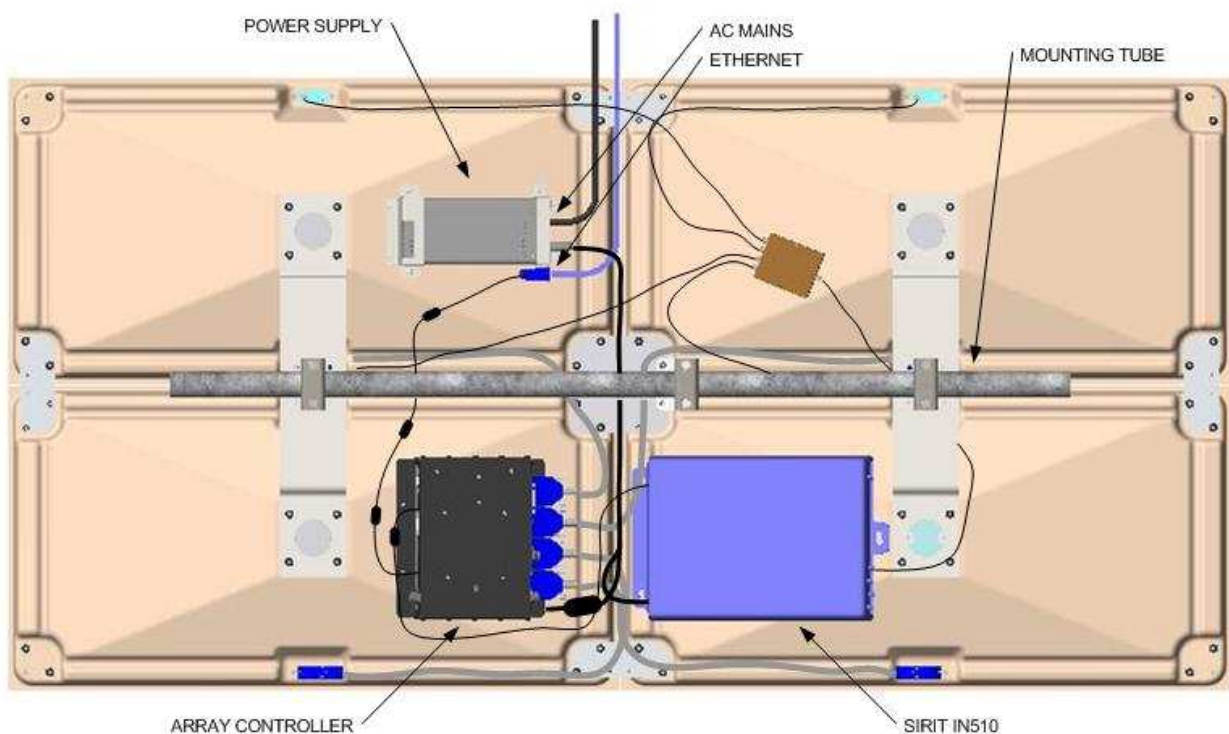
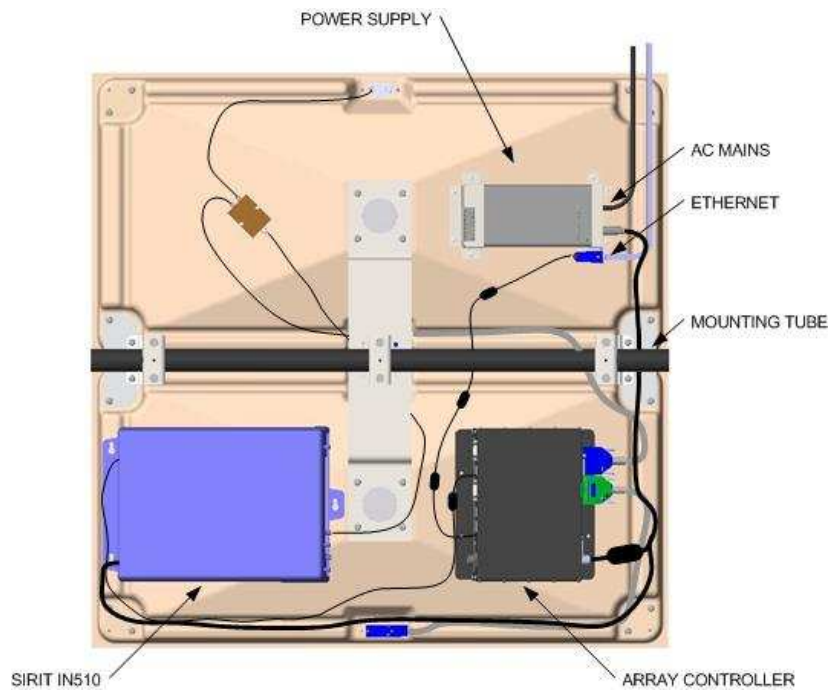
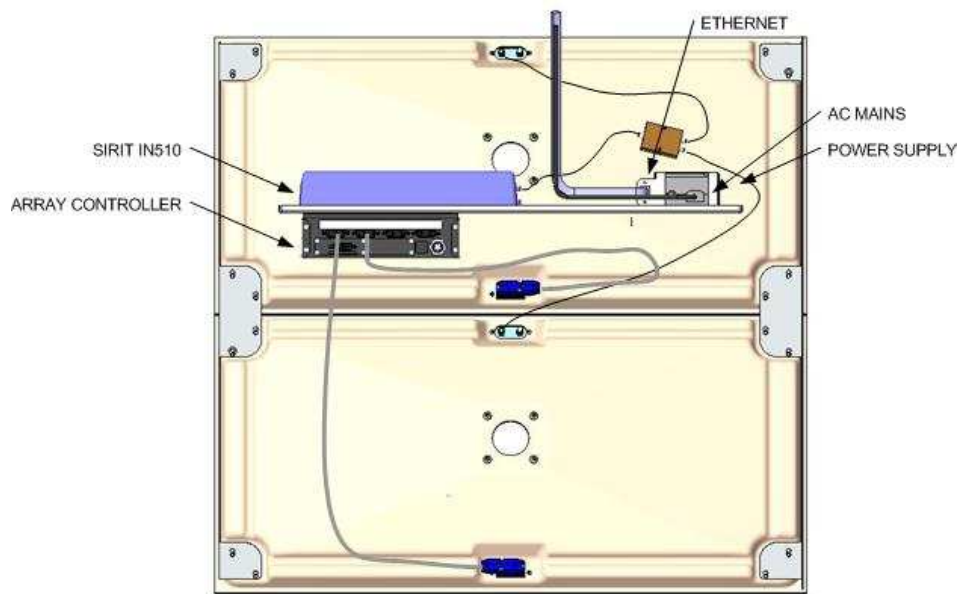


Figure 5  
ITCS-A-100 Power and Ethernet Connections



**Figure 6**  
**ITCS-A-102 Power and Ethernet Connections**



**Figure 7**  
**ITCS-A-104 Power and Ethernet Connections**  
 (Note: This figure is an exploded view looking through one antenna array)



## WARNING

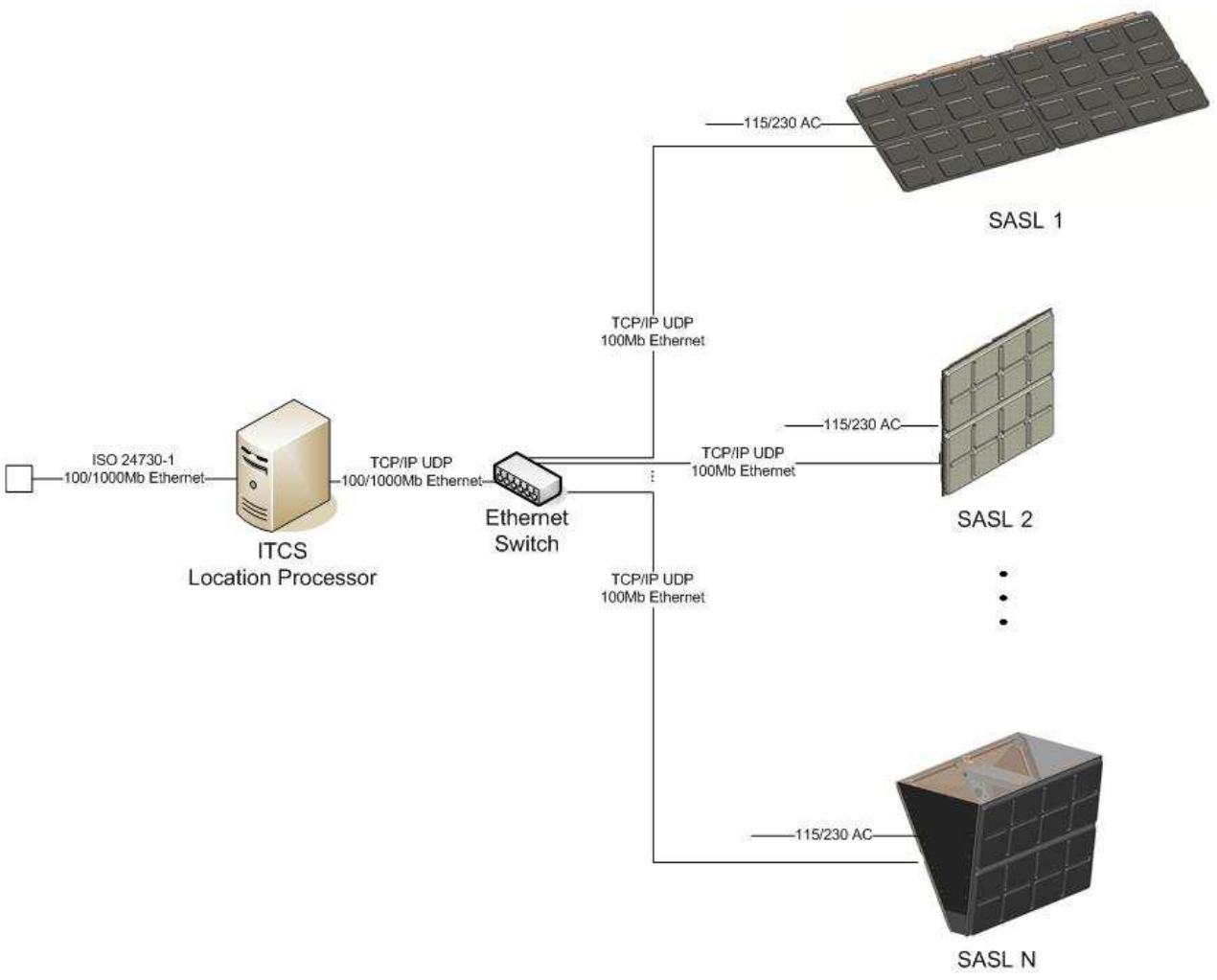
The interconnect wiring and cables on the rear of the SASL are factory installed and are not intended to be field serviceable. The RF cables are specially tuned. Any tampering or modification of these cables or connections will invalidate type approval and may seriously compromise the device performance. Note that the connectors are fitted with tamper evident seals.

## NON IONIZING RADIATION

This unit incorporates a Radio Frequency Transmitter and should therefore be installed and operated so as to avoid exposure of any persons to unsafe emissions. The FCC requires that any antenna, which includes the **SASL**, be mounted so that a separation distance of at least 20cm is provided from all persons. See ***FCC Radiation Exposure Statement*** in the Safety Instructions section of this guide.

## MULTIPLE SASL UNITS CONFIGURED AS AN ITCS

Figure 8 shows how two or more ITCS-A-1xx **SASL** units may be connected via an Ethernet network to an **ITCS** Location Processor, one Location Processor and multiple distributed SASLs operate collaboratively to form RF Controls' Intelligent Tracking and Control System (ITCS™). In this example one each of, ITCS-A-100, ITCS-A-102 and ITCS-A-104 **SASL** units have been attached to the network. Combinations of the various model **SASL** units may be mixed and matched as required to suit a particular installation. The RF Controls **Technical Manual** provides details on how to install, configure and calibrate an **ITCS**. The **Programmers Reference Guide** provides details of the Application Program Interface (API) used by the **ITCS**.



**Figure 8**  
Intelligent Tracking and Control System comprising a number of SASL units connected via an Ethernet Network to an ITCS Location Processor

# Software

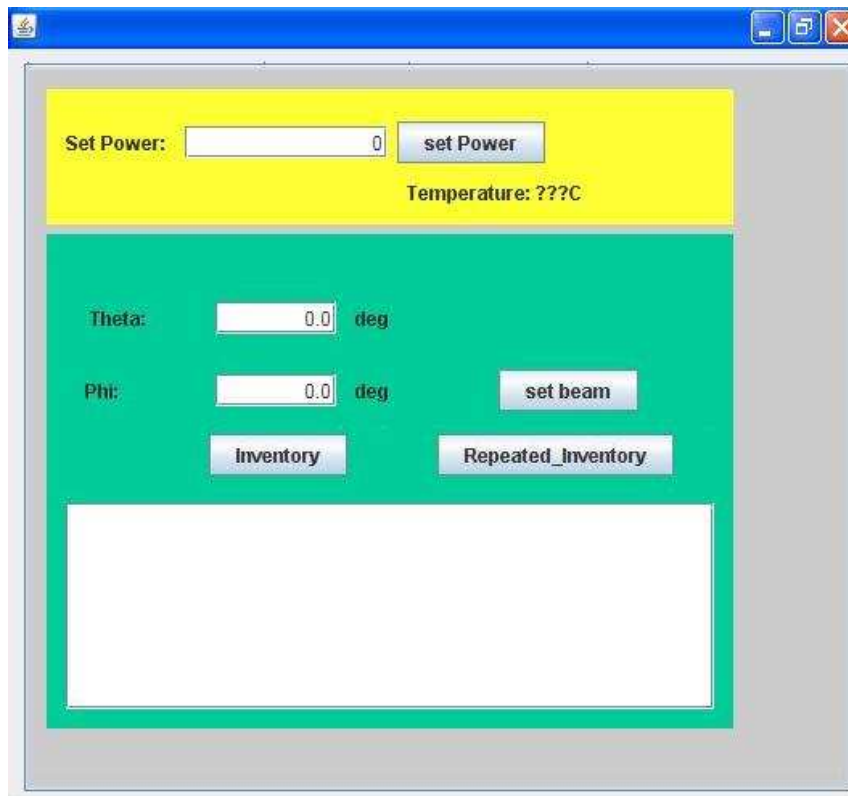
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The **SASL** is provided with a basic test program on a CD, to run on a Microsoft™ Windows® equipped Personal Computer. The program enables you to carry out a number of basic tests:

- Command the **SASL** to transmit
- Adjust the RF output power of the **SASL** as a percentage of maximum power. (Note: the maximum output power is factory set to the maximum RF output power allowed for the particular country of destination).
- Identify a tag by its UII (Unique Item Identifier) ISO18000-6C tag or EPC (Electronic Product Code) in the case of an EPC UHF Gen 2 tag.
- Display the Received Signal Strength of each tag
- Display the Phi  $\Phi$  and Theta  $\theta$  values of the **SASL** beam direction.

The installation software should automatically install when the CD is inserted into the PC. If for any reason it does not auto run, then browse for the **setup.exe** file on the installation CD and run it. Once the program has been successfully installed it may be opened.

Figure 7 shows the basic test program control panel screen.



**Figure 9**  
**Test Program Control Panel Screen**

## USING THE TEST PROGRAM

### Set RF Output Power

Enter the desired RF output power as a percentage of the maximum power into the Set Power box. Click the **set Power** button. Note: the actual maximum Radiated RF Power is factory set to comply with the radio regulations in the country of use. In the USA and Canada this is 4 Watts EIRP and under EN 302 208 this is 2 Watts ERP (3.2 W EIRP).

### Set Beam

The beam direction may be pointed to any desired direction within  $\pm 35^\circ$  of a line perpendicular to the centre of the **SASL** antenna panel. When looking in the direction of the beam (as if through the **SASL**), and with the **SASL** orientated with the arrow upwards, Phi +ve angles are up, -ve angles are down. Theta +ve is left and -ve is right. Enter the steering angles Theta and Phi in the respective boxes and click **set beam**.

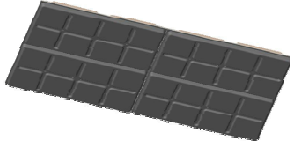
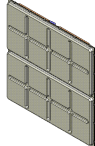

### Read Tags

Click the **Inventory** button. Tag UID (EPC) followed by the Received Signal Strength in dBm will be shown in the window for each tag identified. If there is more than one tag, then each tag identified will be shown on a separate line. Click the **Repeated\_Inventory** button to repeatedly query for tags present in the **SASL** beam. This function is useful for identifying tags that are moving.

## APPLICATION INTERFACE

The **SASL** uses an International Standard, Application Program Interface (API) as defined in ISO/IEC 24730-1. Further details of the API and commands are contained in the **Programmer's Reference Guide**.

# Specifications

General	ITCS-A-100	ITCS-A-102	ITCS-A-104
			
Frequency	UHF band: 860 – 960 MHz <sup>1</sup>		
RF Radiated Output Power	Adjustable from 0.1 to 4 Watts EIRP		
Regulatory Compliance	FCC, CFR47 Part 15.247 EN 302 208		
Reading/writing Protocols	ISO18000-6C / EPC UHF Gen 2		
FCC ID	WFQITCSA100	WFQITCSA102	WFQITCSA104
Application Interface	EM 4122 (TTO) ISO/IEC 24730-1		
<b>Environmental</b>			
Operating Temperature	0 to +55°C		
Storage Temperature	-40 to +85°C		
Relative Humidity	5 to 95% non-condensing		
Dimensions	64in x 32in x 8in (163 x 81 x 20 cm)	32in x 32in x 8in (81 x 81 x 20 cm)	30in x 32in x 28in (76 x 81 x 72 cm)
Weight	75 lbs (34 kg)	50 lbs (23 kg)	85 lbs (39 kg)
<b>Ethernet LAN</b>			
Connector	RJ-45		
Ethernet	10/100 BaseT		
Indicators	Yellow – link operational Green – network traffic detected		
Signals	Pin 1 TXD+ Pin 2 TXD - Pin 3 RXD+ Pin 4 NC	Pin 5 NC Pin 6 RXD - Pin 7 NC Pin 8 NC	
<b>Power Supply</b>			
Input Connector	IEC/EN 60320 C14		
Voltage	90 – 265 Volts AC		
Frequency	47 – 63 Hz		
Consumption	90VA		
<b>Antenna</b>			
Gain <sup>2</sup> (circularly polarized)	8.6 dBi <sup>2</sup>	7.5 dBi <sup>2</sup>	7.5 dBi <sup>2</sup>

<sup>1</sup> The SASL uses the SIRITSIRIT Infinity 510 RFID reader which will be factory set at time of shipping, to suit the country of installation and use.

<sup>2</sup> Nominal maximum value. Precise gain depends on transmit frequency

# Safety Instructions

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This unit emits Radio Frequency non-ionizing radiation. The installer must ensure that the antenna is located or pointed such that it does not create an RF field in excess of that permitted by the Health and Safety Regulations applicable to the country of installation.

## **FCC Radiation Exposure Statement**

**The antenna used on this equipment must be installed to provide a separation distance of at least 20cm from all persons and must not be co-located or operated in conjunction with another antenna or transmitter.**

## **FCC Part 15 Notice**

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

## **Power Disconnect Device**

The plug on the power supply cord is intended to be the power disconnect device. The power source (socket or outlet) shall be located near the equipment and shall be easily accessible.

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**The SASL products and individual BESPAs components are protected by one or more US and International Patents pending.**

The “RF Controls” logo, and the words “RF Controls, Identify, Locate, Track”, “ITCS” and “SASL” are registered Trademarks of RF Controls, LLC.

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