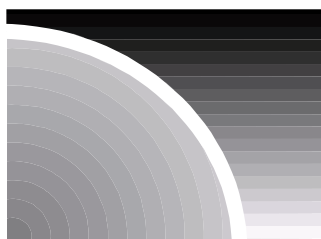


**User's and Technical Manual**

**SIGNAL SWITCHING UNIT**

**ALONE SSU**



**ORBIS OY**

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## 1. PREFACE

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This is the User's and Technical Manual for the SIGNAL SWITCHING UNIT.

Product Line: **NMP SSU**  
Product: **ALONE SSU**  
Product ID: **ORBIS 94018**  
Version: **2.00**  
Manual Issue: **A**

Please note that the versions of single documents attached to this manual do not refer directly to the above product version.

Please read and follow all instructions.

### 1.1 SHIPPED ITEMS

---

The following items are included in the shipment:

ALONE SSU Signal Switching Unit  
Power Cord  
ALONE SSU User's and Technical Manual

### 1.2 CONTACT INFORMATION

---

This manual and the product/system described here are designed and supplied by Orbis Oy.

**ORBIS Test Systems & Instruments:**

Telephone +358 9 478 830  
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## 2. GENERAL SAFETY SUMMARY

---

Review the following safety precautions to avoid injury and prevent damage to this product and any products connected to it. Only qualified personnel should perform service procedures. While using this product, you may need access to other parts of the system. Read the General Safety Summary in other system manuals for warnings and cautions related to operating the system.

### 2.1 INJURY PRECAUTIONS

---

- ***Avoid Electric Overload***

---

To avoid electric shock or fire hazard, do not apply a voltage or power to terminal that is outside the range specified for that terminal.

- ***Ground the Product***

---

This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded.

- ***Do Not Operate Without Covers***

---

To avoid electric shock or fire hazard, do not operate this product with covers or panels removed.

- ***Use Proper Fuse***

---

To avoid fire hazard, use only the fuse type and rating specified for this product.

- ***Do Not Operate in Wet/Damp Conditions***

---

To avoid electric shock, do not operate this product under wet or damp conditions.

- ***Do Not Operate in Explosive Atmosphere***

---

To avoid injury or fire hazard, do not operate this product in an explosive atmosphere.

### 2.2 PRODUCT DAMAGE PRECAUTIONS

---

- ***Use Proper Power Source***

---

Do not operate this product from power source that applies more than the voltage specified.

- ***Provide Proper Ventilation***

---

To prevent product overheating, provide proper ventilation.

- ***Do Not Operate With Suspected Failures***

---

If you suspect there is damage to this product, have it inspected by qualified service personnel.

- ***Do Not Expose The Product To Excessive Vibration***

---

Special care should be taken when moving or operating the ALONE SSU to avoid vibration-related damages.



### **2.3 SERVICE SAFETY SUMMARY**

Only qualified personnel should perform service procedures. Read this *Service Safety Summary* and the *General Safety Summary* before performing any service procedures.

- ***Do Not Service Alone***

---

Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

- ***Disconnect Power***

---

To avoid electric shock, disconnect the main power by removing the power cord.

- ***Use Care When Servicing With Power On***

---

Dangerous voltages or currents may exist in this product. Disconnect power and test leads before removing protective panel, soldering or replacing components.

### 3. USER'S INSTRUCTION

---

#### 3.1 GENERAL INFORMATION

---

##### 3.1.1 ABOUT ORBIS SIGNAL SWITCHING UNIT

---

The Orbis Signal Switching Unit (abbreviation: SSU) described here is a part of a test system and specially designed to meet the needs of automatic test routines. In designing the SSU, flexibility and versatility have been the key issues.

#### 3.2 GETTING STARTED

---

This chapter provides an overview of the ALONE SSU installation and configuration.

- **Installation**

---

**WARNING!** Use care when lifting or moving the ALONE SSU to avoid personal injury while performing the installation procedure.

When unpacking please check that the following parts are included:

ALONE SSU

Power Cord

SSU User's and Technical Manual

The ALONE SSU is designed to operate on a bench or in the rack environment. For proper cooling, allow at least 10 cm of clearance on the rear and 5 cm on both sides of the chassis.

Check the compatibility of your electrical system with the ALONE SSU that you have received. The mains voltages and fuse current ratings are specified in the type plate in the rear cover of the ALONE SSU.

Use a proper IEC power cord when connecting the ALONE SSU to the electrical system. The power cord connector is located in the rear panel and is integrated in the same package with the mains switch and mains fuse holder.

- **Configuration**

---

Only needed configuration is to select correct fuse current rating for your mains voltage. The mains voltages and fuse current ratings are specified in the type plate in the rear cover of the unit.

### 3.3 HARDWARE STRUCTURE

---

#### 3.3.1 GENERAL HARDWARE STRUCTURE

---

The ALONE SSU is divided in two elements, RF connection and control equipment for the RF connection. RF signal routes include several switches, attenuator and power splitter needed in specified test routines. The RF signal routes are controlled from CONTROL-connector. All route functions can be controlled by external SPNO relays/switches (10 pcs).

For closer information please refer to the *ALONE SSU Block Diagram* and *ALONE SSU Technical documentation*.

#### 3.3.2 FUNCTIONS OF THE ALONE SSU

---

The purpose of the ALONE SSU is to provide all the necessary RF signal routings between Device Under Test (DUT) and Measuring instruments.

#### 3.3.3 CONNECTORS

---

- **RF**

---

All RF connectors are N female type.

- **CONTROL**

---

Standard 25D female connector

- **MAINS**

---

IEC male connector.

Mains 115/230 VAC, Fuse 3.15AT/115 VAC 1.6AT/230 VAC (5 X 20 mm), the fuse holder and the mains power switch are located in the line connector. The line connector is located in the rear panel of the chassis.

#### 3.3.4 INDICATORS

---

- **POWER**

---

LEDs for power supply voltages ( Vcc1, Vcc2).

- **CONTROL LINES (L1 - L10)**

---

LEDs for control line indication, when the control line is active equivalent LED in on.



### 3.4 SOFTWARE STRUCTURE

The ALONE SSU application software is not supplied by ORBIS Oy.

### 3.5 CONTROLLING THE ALONE SSU

#### 3.5.1 CONTROLLING RF-RELAYS RFR1A TO RFR9B

Control lines (LINE1-10) in CONTROL-connector are connected direct to Relay driver-boards (RE1, RE2). The switch relays in the ALONE SSU are connected to Relay driver-boards. All route functions can be controlled by external SPNO relays/switches (10 pcs). Connect relay or switch between common pin (21...25) and control line pin wanted to be controlled. When the relay/switch is open equivalent RF-relay(s) is in position 1 (NC). When the relay/switch is close equivalent RF-relay(s) is in position 2 (NO) and control line LED is on.

For naming of RF-relays please refer to the *ALONE SSU RF Block Diagram*.

Control Line	Control connector PIN No	RF Relay(s) Name	Attention
1	1	RFR 1A and RFR 1B	
2	2	RFR 2A and RFR 2B	
3	3	RFR 3A and RFR 3B	
4	4	RFR 4A and RFR 4B	
5	5	RFR 5	
6	6	RFR 6	
7	7	RFR 7	
8	8	RFR 8	
9	9	RFR 9A and RFR 9B	
10	10	Not in Use	
COMMON	21		
COMMON	22		
COMMON	23		
COMMON	24		
COMMON	25		
GND	19		
SHIELD	20		

## 4. SERVICE

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### 4.1 PREVENTIVE MAINTENANCE

---

The ALONE SSU product line is designed to be user-friendly, so there is no need of preventive maintenance if operated in normal electronics production environment i.e. the operating environment is free of excessive vibration, temperature, dust and humidity. (Except parts, which are shown on the table below.)

DESCRIPTION	TIME BETWEEN MAINTENANCES	RESPONSIBILITY	ACTION TO BE PERFORM	MANUFACT. & PART CODE	ORBIS PART CODE
Rear Panel Air Filter(s)	Maximum 6 Months	User	Cleaning or Changing Part	-	90688

### 4.2 CALIBRATION AND SERVICE

---

The final calibration is done at the manufacturer's factory prior to shipping. The recommended recalibration interval is one year. ORBIS Oy provides calibration services to its customers upon request. For contact information please refer to chapter 1.2 *CONTACT INFORMATION*.

## 5. SPECIFICATIONS

---

### 5.1 ENVIRONMENT

---

+5°C to +40°C Less than 95% R.H. Non-condensing.

### 5.2 DIMENSIONS

---

Height	132.5 mm	(3U)
Width	482.6 mm	(19")
Depth	525 mm	

### 5.3 COOLING

---

Forced air cooling is provided by a fan. Air is drawn in from the rear and exits at the sides of the chassis.

### 5.4 MAINS POWER INPUT

---

Two stage IEC plug filter conforming to IEC320 with integral single fuse and double pole ON/OFF-switch.

- **Connector**

---

Standard IEC plug

- **Power Input Requirement:**

---

Voltage Range	115 / 230 VAC Nominal
Frequency	50 - 60 Hz
Power Consumption	100 W Maximum
Fuse	1.6AT/230 VAC 3.15AT/115 VAC

### 5.5 CONTROL INTERFACE

---

All route functions can be controlled by external SPNO relays/switches (10 pcs).

- **Connector**

---

D-25 female

### 5.6 DISPLAY

---

LEDs for power supply voltages (Vcc1, Vcc2) and control lines (L1...L10).

## 5.7 RF CHARACTERISTICS

- Connectors:**

---

All RF-connectors are N-female type

- Frequency Range:**

---

0.5 - 2.0 GHz	Routes via RFS1
DC - 4.0 GHz	All other routes

- Max. Input Power:**

---

1W	RF IN 2
* 2W	D TX, MS, P
	<b>* If T1/T2 is in connection</b>
* 10W	INT 1, N, RF IN OUT, D TX, MS, P
	<b>* If RFS1 is in connection</b>
50W	All other inputs

**ATTENTION!**

Hot switching with all Coaxial RF-switches is not recommended. Maximum power applied during switching should not exceed 1 Watt CW.

- RETURN LOSS:**

---

Minimum  $\geq 17$ dB  
 Typical  $\geq 20$ dB

Routes via RFS1:

0.5 - 2.0 GHz	Minimum $\geq 15$ dB
---------------	----------------------

---

- INSERTION LOSS:**

---

ROUTE	Ins. Loss DC-1.0GHz	Ins. Loss 1-2GHz	NOTE
CH1 IN, FCH1 IN - CH1 OUT, FCH1 OUT	≤1.0dB	≤1.3dB	
CH2 IN, FCH2 IN - CH1 OUT	≤1.0dB	≤1.3dB	
INT 1 - FCH2 IN	≤0.5dB	≤0.8dB	
INT 1 - D TX	*≤5.5dB	≤7.1dB	* 0.5-1.0GHz
INT 1 - MS, P	*≤6.1dB	≤8.1dB	* 0.5-1.0GHz
FCH2 OUT - D TX	*≤5.2dB	≤6.6dB	* 0.5-1.0GHz
FCH2 OUT - MS, P	*≤5.8dB	≤7.6dB	* 0.5-1.0GHz
N - D TX	*≤4.9dB	≤6.1dB	* 0.5-1.0GHz
N - MS, P	*≤5.5dB	≤7.1dB	* 0.5-1.0GHz
RF IN OUT - D TX	*≤4.6dB	≤5.6dB	* 0.5-1.0GHz
RF IN OUT - MS, P	*≤5.2dB	≤6.6dB	* 0.5-1.0GHz
D ANT - MS, P	≤1.0dB	≤1.3dB	
RF IN 2 - D RX	≤20.3dB	≤20.5dB	

**5.8 RF COMPONENTS**
**RF-Relay HP 8765B:**

Frequency Range:	DC-20.0 GHz	
Insertion Loss [dB]:	$0.2 + 0.025f$	f is frequency in GHz
SWR:	<1.2 dc to 4 GHz	
	<1.35 4 to 12.4 GHz	
	<1.45 12.4 to 18 GHz	
	<1.7 18 to 20 GHz	
Isolation:	$\geq 80$ dB	DC-20.0 GHz

**RF Power Splitter Mini-Circuit ZAPD-21:**

Frequency Range:	0.5-2.0 GHz	
Insertion Loss:	Typical	$\leq 3.25$ dB
	Maximum	$\leq 4.0$ dB
Return Loss:	$\geq 15$ dB	
Isolation:	Typical	$\geq 25$ dB
	Minimum	$\geq 18$ dB
Max. Power:	10W AVG	

**RF Attenuator HP HP8493A:**

Frequency Range:	DC-12.4 GHz	
Attenuation:	$20 \text{ dB} \pm 0.6 \text{ dB}$	
Return Loss:	$\geq 20.8$ dB	DC-8 GHz
Max. Power:	2W AVG	

**RF Terminator SUHNER 65SMA-50-0-1:**

Frequency Range:	DC-18.0 GHz	
Return Loss:	$\geq 32$ dB	DC-4.0 GHz
Max. Power:	1W AVG	DC-18.0 GHz



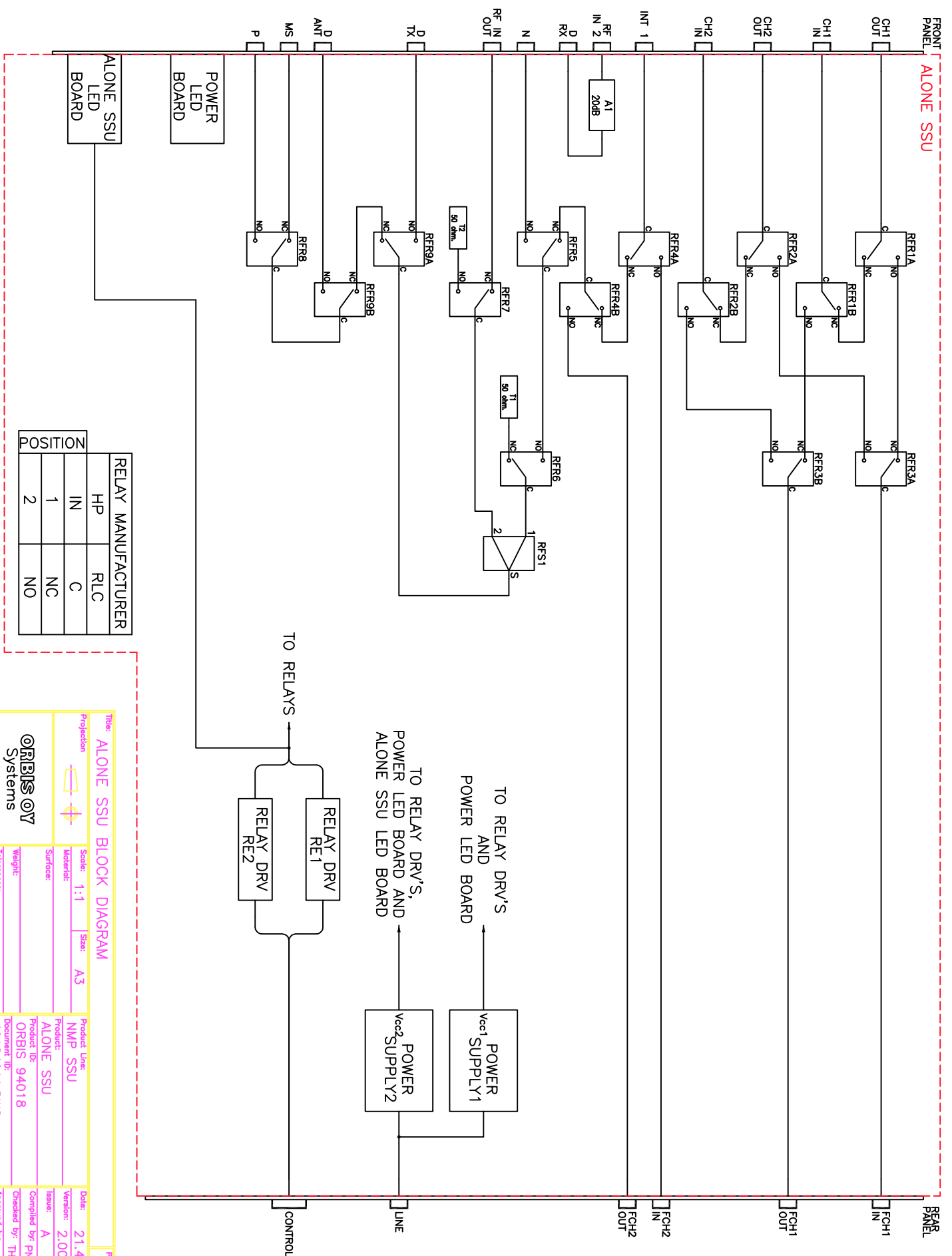
## **6. BLOCK DIAGRAMS**

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This section contains the block diagrams of the ALONE SSU. The following documents are included:

<b>DOCUMENT TITLE</b>	<b>DOCUMENT ID</b>
ALONE SSU Block Diagram	40184011.DWG

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ALONE SSU BLOCK DIAGRAM

Title: ALONE SSU BLOCK DIAGRAM		Scale: 1:1		Size: A3		Product Line: NMP SSU		Date: 21.4.1999		Page: 1/1	
Projection:		Tolerances:		Surface:		Product: ALONE SSU		Version: 2.00		Issue: A	
ORBIS Systems		Weight:		Tolerances:		Product Id: ORBIS 94018		Checked by: PNI		Compiled by: PNI	
						Document Id: 40184011.DWG		Approved by: THA		Approved by: ERO	