



SCAN~LINK

armour



USER'S MANUAL

This manual applies to the following single Antenna Unit models with In-Cab Display:

**Antenna Unit Model Number:
Configuration Option**

**SLAU-270NB
Description**

SLAU-UV-NB-07

Standard Narrow Beam Antenna

SLAU-UV-NB-DT-07

Standard Narrow Beam Antenna with Data

SLAU-UV-NB-RT-07

Relay Output Narrow Beam Antenna

SLAU-UV-NB-RT-DT-07

Relay Output Narrow Beam Antenna with Data

SLAU-UV-NB-ERT-07

Enhanced Relay Output Narrow Beam Antenna

SLAU-UV-NB-ERT-DT-07

Enhanced Relay Output Narrow Beam Antenna with Data

In-Cab Display Unit:

SLDU-006SR

Standard Output

SDLU-006SRE

Enhanced Output In-Cab Display Unit

This guide contains directions on the legally mandated requirements for a proper installation.

Improper installation and/or modifications to the device not expressly approved by SCAN~LINK Technologies Inc. may expose the operator to harmful radiation and may void the user's authority to operate the equipment.

The SCAN~LINK Armour System™ is to be used only as a tool to assist a vehicle operator and does not replace any safety procedures in place, nor does it remove any responsibility for the safe operation of the vehicle from the driver.

CAUTION:

Changes or modifications not expressly approved by SCAN-LINK Technologies Inc. could void the user's authority to operate the equipment.

The SCAN~LINK Armour System™ is intended for use on mobile equipment in construction and industrial applications. It is not intended for use by the general public.

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Disclaimer

The SCAN~LINK Armour System™ is not 'safety rated' and thus cannot be relied on as front-line defense against equipment-to-pedestrian or equipment-to-object strikes. It is intended as a supplementary safety system only, to improve operator and pedestrian awareness and to help 'fill in' blind spots. There is no replacement for proper training and operation of equipment. The SCAN~LINK Armour System™ is designed to augment existing site safety practices and policies, to further inhibit the chances of worker injuries and fatalities. Remember, pedestrians will not be detected if they are not wearing functioning, SCAN~LINK™ tagged safety wear. All employees and visitors to any operations site should be trained in the functionality of the SCAN~LINK Armour System™ and be fully aware of their surroundings while on site.

The SCAN~LINK Armour System's™ installation, operation and maintenance, in all its forms, is covered by various legal documents, disclaimers and procedures, all of which are available upon request. By using the SCAN~LINK Armour System™ or any of its components, you are bound to adhere to the conditions and practices outlined therein.

Product Description

The SCAN~LINK Armour System™ has been designed to increase the probability of detection of a tagged ground worker or tagged object in the vicinity of mobile heavy equipment. The SCAN~LINK Armour System™ scans for Radio Frequency Identification (RFID) tags using an Ultra High Frequency (UHF) transceiver operating in the unlicensed 865.7MHz to 867.5MHz Industrial Scientific and Medical (ISM) frequency band. Proper operation of the SCAN~LINK Armour System™ requires that the work site is free of interference causing Radio Frequency (RF) devices. Such interference causing devices may include 2-way radios, wireless crane controllers and other RFID based scanning systems operating within or near the 865.7MHz to 867.5MHz ISM frequency band. SCAN~LINK Technologies Inc. recommends that all potential customers perform a Wireless Site Survey to ensure that the work site is free of interference causing Radio Frequency (RF) devices before installing the SCAN~LINK Armour System.

The SCAN~LINK Armour System™ consists of two units, the Antenna Unit, and the Display Unit. The Antenna Unit is typically mounted on the back of a vehicle to detect the presence of ground workers wearing an Armour equipped Safety Vest and/or Hard Hat. When a tagged ground worker is detected, the Antenna Unit sends a message to the Display Unit mounted inside the cab which then alerts the operator through an audible and visual alarm. The Display Unit displays the operational status of the SCAN~LINK Armour System™ whenever the vehicle ignition is on, but only gives visual and audio alarms for ground worker detection when the Reverse Input Line to the Antenna Unit or the Display Unit is Positive Active. The SCAN~LINK Rapid Pair™ software is used to configure the operating parameters of the SCAN~LINK Armour System™, including which Reverse Input Line to use to enable visual and audio alarms.

Antenna Unit

The Antenna Unit transmits and receives digital RFID signals over the 865.7MHz-867.5MHz frequency band to search for SCAN~LINK Armour safety apparel within its detection range. The Antenna Unit processes information from the responding tags to identify if any genuine SCAN~LINK Armour vests and/or safety hats are in the range. If SCAN~LINK Armour safety apparel is detected, the Antenna Unit transmits a separate signal in the 2.4GHz frequency band to the Display Unit to activate an audible and visual warning.



Figure 1: SCAN~LINK™ Antenna Unit

The Antenna Unit requires power from the vehicle's power source. It also requires a positive activation of the Reverse Input Line if this input is configured to be used to activate the Antenna Unit only on reverse vehicle operation. All other functions of the antenna are performed over the 2.4GHz radio link. The wires into the Antenna unit are routed with a splash-proof connector to protect the device against water leakage. A moisture vent is incorporated in the Antenna Unit case so that moisture inside the case can vent to the outside.

In-Cab Display Unit

The Operator Display unit seen below is to be installed inside the vehicle cabin in the vicinity of the operator, *but no closer than 20cm (8 inches)*, so that it can be clearly seen and heard. The Operator Display receives signals from the antenna when genuine Armour safety apparel is detected in the range of the Antenna Unit.

The Display Unit is in periodic contact with the Antenna Unit to ensure the communication link and tag detection throughput between the antenna element and the display is functioning properly and reporting no errors. If the wireless connection between the display and the antenna is compromised, the power LED will blink amber and an optional audible sound (if enabled through the SCAN~LINK Rapid Pair™ software) will be generated. SCAN~LINK™ apparel will not be detected if the power LED is amber.



Figure 2: SCAN~LINK™ Display Unit

In-Cab Display Unit Interface

Function	Description	
Power LED	Solid Green	Normal Operation
	Flashing Amber	Communication Error with Antenna Unit
	Solid Red	Display Hardware Error
In-Reverse LED	On when the Reverse Input is Positive Active	
LED Cluster	In normal operation, the LED cluster illuminates when SCAN~LINK™ Apparel is detected. When adjusting the volume, the speaker volume level is shown. When in Diagnostics Mode, error codes are displayed.	
Speaker	Emits an audible 3Hz beep when SCAN~LINK™ Apparel is being detected and the Reverse Trigger is enabled.	
Volume Button	When not detecting SCAN~LINK™ Apparel, press momentarily or continuously to adjust the volume. As the volume is being adjusted, the LED cluster will indicate the volume settings. The more LEDs that are on, the higher the volume.	

In-Cab Display Unit Indications

The following display modes are possible with the SCAN~LINK In-Cab Display Unit:

	DISPLAY LIGHTS	AUDIBLE	MEANING
WORKING		NONE	The system is off (unpowered).
		NONE	The In-Cab Display and Antenna units are functioning properly.
		NONE	The In-Cab Display and Antenna units are functioning properly. Reverse Input is active.
		Beeping at 3Hz	In-Cab Display and Antenna units are functioning properly. Reverse Input is active. SCAN~LINK™ Apparel or Tags detected.
MALFUNCTIONING		NONE	In-Cab Display Hardware Error
		Beeping at 0.5Hz if 'Buzz on Communications Error' is enabled via Rapid Pair™	Wireless Communications Error
			Throughput Detection Error, Reverse Input is Active
			Throughput Detection Error
			Antenna Start-up Parameter Setup Error
			Tag Detection Power Level Setting Error
			Antenna Detection Error (Reader Response Error)
			Antenna Temperature Range Error
			Antenna Soft Reset Error
			Antenna Communications Protocol Error
			Indicator Communications Protocol Error

Detection Range

The factory set detection range is approximated as a fan shaped beam, shown in Figure 3. The range is adjustable using the SCAN~LINK Rapid Pair™ software. The strength of the received digital RFID signals increases as the separation between the Antenna Unit and the SCAN~LINK Armour System™ safety apparel decreases. The onset of detection typically begins at 6 meters, however, consistent detection at 6 meters cannot be guaranteed.

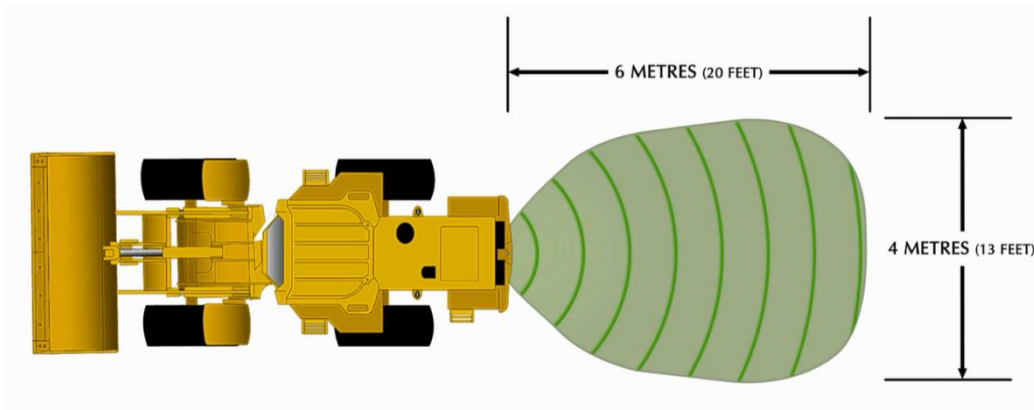


Figure 3: Approximate Detection Range

Personnel can be detected by the SCAN~LINK Armour System™ if they are wearing the SCAN~LINK Armour safety apparel and are within the detection range of the SCAN~LINK Antenna unit. Multiple RFID tags are used within the SCAN~LINK Armour safety apparel to improve the probability of detection. The ability of the SCAN~LINK Armour System™ to detect a tag will vary with tag orientation, movement, mounting surface, moisture content, line of sight and proximity to the human body.


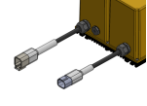
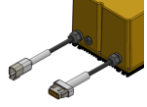
SCAN~LINK Safety apparel should be tested regularly using a SCAN~LINK Tag Health Tester and should be kept dry and free of dirt, snow, ice and other contaminants. Proper tag mounting and orientation instructions should be followed when installing SCAN~LINK RFID Tags into Hard Hats. SCAN~LINK Safety Vests should be fully fastened to improve front and back detection.

Personnel wearing multiple articles of SCAN~LINK Safety apparel, such as a SCAN~LINK equipped Safety Vest and Hard Hat, will have a higher probability of being detected by the SCAN~LINK Armour System™ than those wearing only a single article of SCAN~LINK Safety apparel.

Product Specification

Antenna Unit Models

There are three SCAN~LINK Armour System™ Antenna Models. They can be identified by part numbers below:

SLAU-UV-00-NB-00-00-0x-07	Base Single wire exits case bottom on the left side	
SLAU-UV-00-NB-RT-00-00-0x-07	Relay Trigger 'Base' + four-pin relay output connector exiting case bottom on the right side	
SLAU-UV-00-NB-RE-00-00-0x-07	Enhanced Relay Trigger 'Relay Trigger' replaces four-pin connector with twelve-pin enhanced relay output connector exiting case on the bottom right side	

A Data Logging software upgrade may be programmed onto any of the three models. Models where x=0 do not have Data Logging software, and where x=1, such software is present.

Absolute Specifications

Item	Minimum	Maximum	Notes
Input Voltage	+9 VDC	+34 VDC	Do not attempt to operate outside nominal 12-28VDC
Operating Temperature	-20° C	50° C	Cold temperature version available
Storage Temperature	-30° C	80° C	
Ingress Protection	IP65		Do Not Immerse
Reverse Polarity Protected	Yes		
Voltage Spike Withstand	SURVIVAL < 3ms: -600V/+400V		

Physical Specifications

Item	Metric (mm)	Imperial (in)	Notes
Height	128 mm	5 1/16"	'Depth' when mounted on equipment
Length	246 mm	9 11/16"	'Height' when mounted on equipment
Minimum Install Length	292 mm	11 1/2"	Clearance for cable gland and wire bend
Width	165 mm	6 1/2"	
Wire Length	400 mm	15 5/8"	Measured from case to tip of connector
Back Plate	Black Anodized Aluminum		
Casing	Yellow Polycarbonate/ABS Alloy Plastic		
Mounting Channels	11 mm	7/16"	Designed for 6mm (1/4") bolts
Installation Orientation	Vertical, Cables Down		Moisture vent <i>must face downward</i>
Power Connector	Deutsch DTM04-6P		Mates w/Deutsch DTM06-6S
Relay Connector	Deutsch DT04-4P		Mates w/Deutsch DTM06-4S
Enhanced Relay Connector	Deutsch DTM04-12PA		Mates w/Deutsch DTM06-12SA

Electrical Specifications

Item	Minimum	Maximum	Notes
Nominal Input Voltage (VCC)	+12 VDC	+28 VDC	On models with 'UV' in model number
Input Current @ 12 VDC	0.28 A		Nominal (not including VCC Relay Load)
Input Current @ 24 VDC	0.14 A		Nominal (not including VCC Relay Load)
Recommended External Fuse	5A		Ensure fuse accommodates connected relay loads
Reverse Input Trigger Voltage	4.5 VDC	VCC	Opto-isolated
Reverse Input Current Draw	1.5 mA	6 mA	Resistor limited
Detection Relay Contact Rating	-	2A @ 5VDC	RT/ERT Models Only
Solid State Relay Voltage	-	220 V	ERT Model Only
Solid State Relay Current	-	80mA	ERT Model Only
Fault Relay Contact Rating	-	2A @ 5VDC	ERT Model Only
RFID Scanner Radio Frequency	865.7 MHz	867.5 MHz	ETSI, 1.84W ERP
Wireless Link Frequency	2405 MHz	2475MHz	Unlicensed ISM Band, 0.085W EIRP
Registration	FCC/IC/ACMA/EACU		Under SCAN~LINK Technologies Inc.
FCC ID	YUU-SLAU270NB		Under SCAN~LINK Technologies Inc.

Pinout Specifications

Power Connector	Pin 1 Power Supply	VCC (+12-28 VDC)		Pin 6 Communications*	RS485 Signal Common., Do Not Connect	
	Pin 2 Power Supply	VDD (-) Equipment Ground		Pin 5 Communications*	RS485 Signal +, Do Not Connect	
	Pin 3 Reverse	Reverse Input		Pin 4 Communications*	RS485 Signal -, Do Not Connect	
Relay Connector	Pin 1 Power	VCC (+)		Pin 4 Power	VDD (-)	
	Pin 2 VCC Relay	Detecting	Open	Pin 3 VCC Relay	Detecting	VCC (+), 1A Max
		Not Detecting	VCC (+), 1A Max		Not Detecting	Open
Enhanced Relay Connector	Pin 1 + Power	Always	VCC (+)	Pin 12 - Power	Always	VDD (-)
	Pin 2 VCC Relay	Detecting	Open	Pin 11 VCC Relay	Detecting	VCC (+), 1A Max
		Not Detecting	VCC (+), 1A Max		Not Detecting	Open
	Pin 3 Solid State Relay	Detecting	Open	Pin 10 Solid State Relay Common	Always	80mA / 60 Ohms 220V Max
		Not Detecting	Connected to Solid State Relay Common			
	Pin 4 Detection Relay Normally Closed	Detecting	Open	Pin 9 Fault Relay Normally Open	Fault or No Power	Open
		Not Detecting	Connected to Detection Relay Common		No Fault	Connected to Fault Relay Common
	Pin 5 Detection Relay Common	Always	Detection Relay Common	Pin 8 Fault Relay Common	Always	Fault Relay Common
	Pin 6 Detection Relay Normally Open	Detecting	Connected to Detection Relay Common	Pin 7 Fault Relay Normally Closed	Fault or No Power	Connected to Fault Relay Common
		Not Detecting	Open		No Fault	Open

RS-485 Communications Note

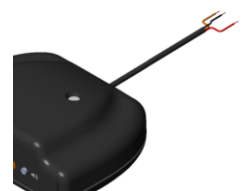
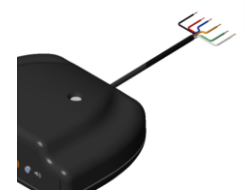
The RS-485 connections on the power harness are used for diagnostic and repair purposes only. They do not allow configuration, firmware upgrades or other features without specialized, proprietary software and procedures. Any connection to these pins for any purpose or any attempt to communicate with the device not only voids any warranty claims, but may also destroy the functionality of the device beyond repair and compromise its ability to act as supplementary safety equipment.

Compatibility Specifications

RapidPair™	RapidPair 2.0 Dongle Only (RPD-SS200 or RPD-SN220)
In-Cab Display Unit	SLDU-006SR and SLDU-006SRE

In-Cab Display Unit Models

There are two SCAN~LINK Armour System™ Display Models. They can be identified by part numbers below:

SLDU-006SR	Standard In-Cab Display Unit	
SLDU-006SRE	Enhanced In-Cab Display Unit SLDU-006SR model plus three extra wires for detection and fault relays, 15 foot (4.5 meter) cable	

Absolute Specifications

Item	Minimum	Maximum	Notes
Input Voltage	+9 VDC	+34 VDC	Do not attempt to operate outside nominal 12-28VDC
Operating Temperature	-20° C	50° C	
Storage Temperature	-30° C	80° C	
Ingress Protection	IP52		Indoor Use Only
Reverse Polarity Protected	Yes		100V/20A
Voltage Spike Withstand	SURVIVAL < 3ms: -600V/+400V		

Physical Specifications

Item	Metric (mm)	Imperial (in)	Notes
Height	35 mm	1 3/8"	
Length	75 mm	3"	
Minimum Install Depth	95 mm	3 3/4"	Clearance for wire bend
Width	100 mm	4"	
Cable Length (SLDU-006SR)	2130 mm	84"	Last 3" (75 mm) are stripped back
Cable Length (SLDU-006SRE)	4570 mm	180"	Last 3" (75 mm) are stripped back
Hook-and-Loop Thickness	5 mm	1/4"	
Casing	Black ABS		UL945VA Rated
Cable Specs (SLDU-006SR)	3-Wire, 18ga.		Bare Wire
Cable Specs (SLDU-006SRE)	6-Wire, 20ga.		Bare Wire
Min. Install Distance from Operator	200 mm	8"	
Beeper Min Volume	88±1 dBa		Measured @ 200 mm (8"), Typical
Beeper Max Volume	99±1 dBa		Measured @ 200mm (8"), Typical

Electrical Specifications

Item	Minimum	Maximum	Notes
Nominal Input Voltage (VCC)	+12 VDC	+28 VDC	
Input Current @ 12 VDC	120 mA		Nominal
Input Current @ 24 VDC	60 mA		Nominal
Recommended External Fuse	1A		
Internal Fuse	1.5A		Auto-resetting
Fault/Detection Relay Current	-	2A	
Reverse Input Trigger Voltage*	4.5 VDC	VCC	Opto-isolated
Reverse Input Current Draw*	1.5 mA	6 mA	Resistor limited
Wireless Link Frequency	2405 MHz	2475MHz	Unlicensed ISM Band, 0.098W EIRP
Registration	ACMA/EACU		Under SCAN~LINK Technologies Inc.
FCC ID	U90-SM220		Under Synapse Wireless Inc.

Reverse Trigger Note

The Reverse Trigger (Orange) wire on the In-Cab Display Unit may be *optionally* tied to a reverse signal and used in place of the Antenna's reverse signal. *However*, operation in this mode requires additional configuration with RapidPair™ and has no function whatsoever until the appropriate settings are changed.

Cable Specifications

Power Cable	Red Wire Power Supply	Always	VCC (+12-28VDC)
	Black Wire Power Supply	Always	VDD (-) Equipment Ground
	Orange Wire Reverse Input	Always	Reverse Input
	Blue Wire (SLDU-006SRE Only) Fault Relay	Fault / No Power	Open
		No Fault / Power	Closed to Relay Common (Green)
	Green Wire (SLDU-006SRE Only) Relay Common	Always	
	White Wire (SLDU-006SRE Only) Detection Relay	Detecting / No Power	Open
		Not Detecting / Power	Closed to Relay Common (Green)

Compatibility Specifications

RapidPair™	RapidPair 2.0 Dongle Only (RPD-SS200 or RPD-SN220)
Antenna	SLAU-UV-NB-xx-xx-xx-04,SLAU-UV-NB-xx-xx-xx-06,SLAU-UV-NB-xx-xx-xx-07

Agency Certifications

FCC

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.

Any changes or modifications of this product, not approved by manufacturer will void the user's authority to operate the equipment.

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the installation manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense.

IC

This device complies with Industry Canada licence-exempt RSS standard(s). Operation is subject to the following two conditions: (1) this device may not cause interference, and (2) this device must accept any interference, including interference that may cause undesired operation of the device.”

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

FCC/IC

To comply with FCC/IC RF exposure limits for general population / uncontrolled exposure, the SCAN~LINK™ Antenna Unit and the Operator Display Unit must be installed to provide a separation distance of at **least 20cm (8 inches)** from all persons and must not be co-located or operating in conjunction with any other antenna or transmitter.

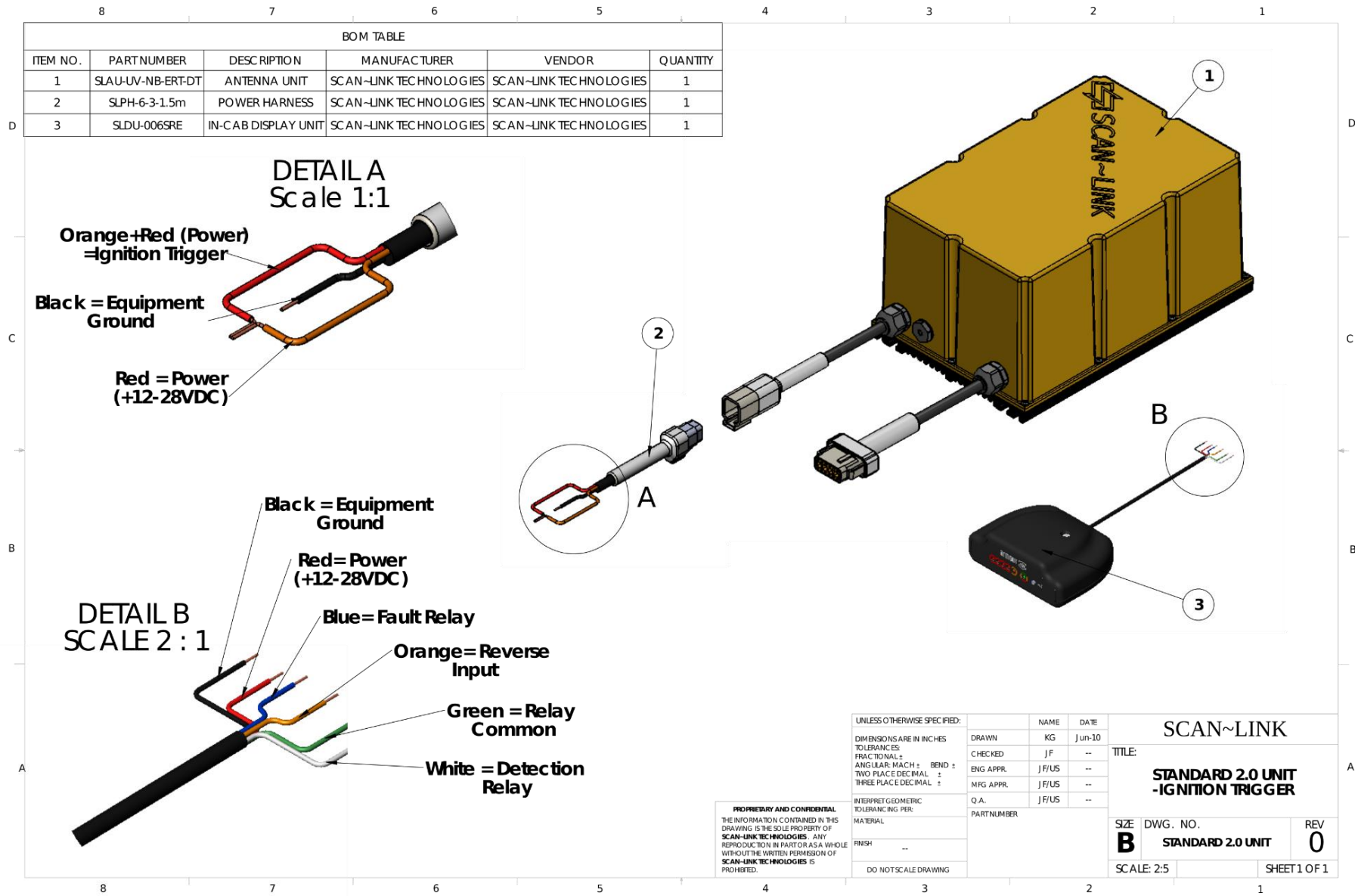
For further information on RF exposure and compliance, please visit the following links:

<https://support.scan-link.com>

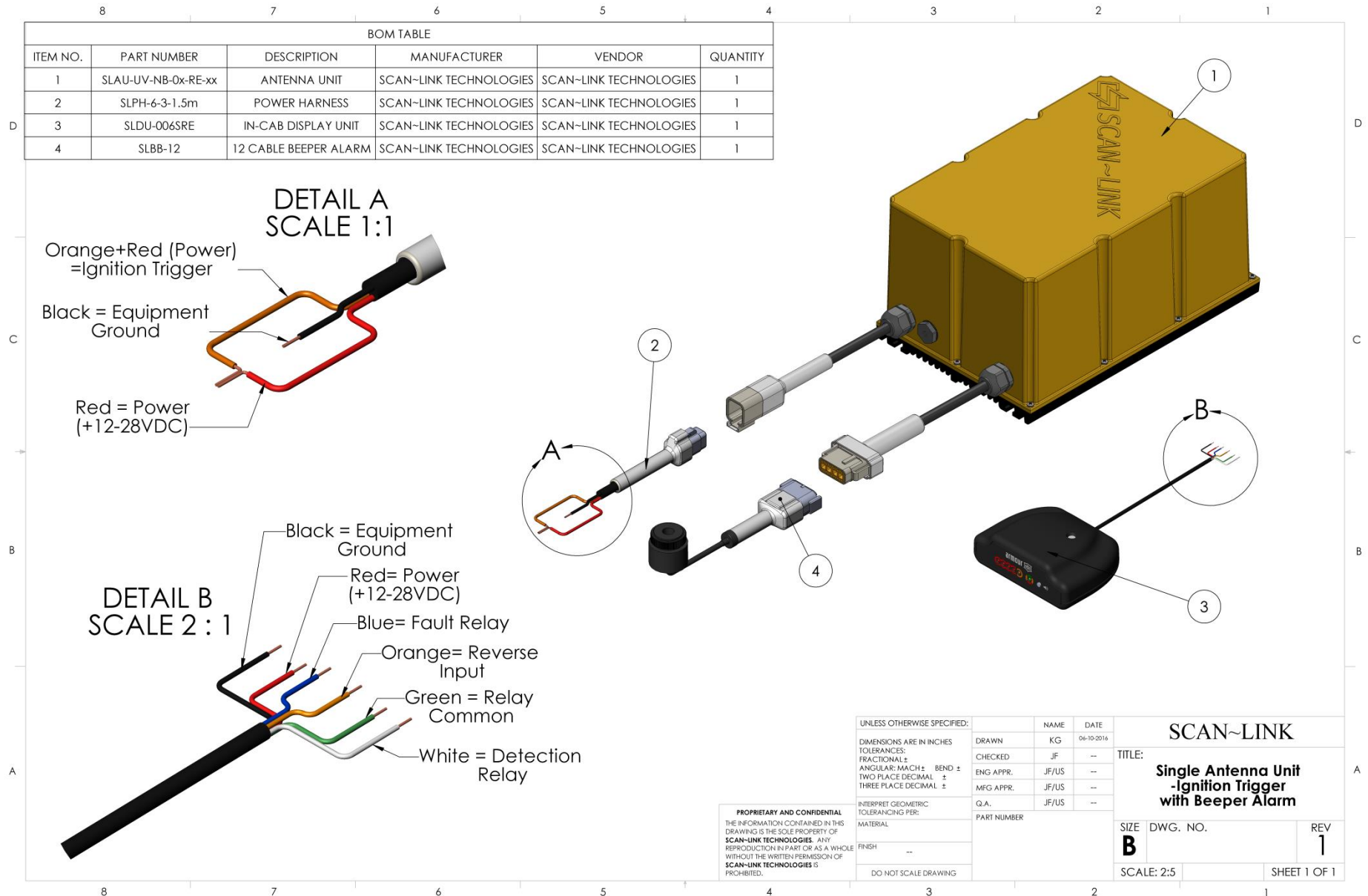
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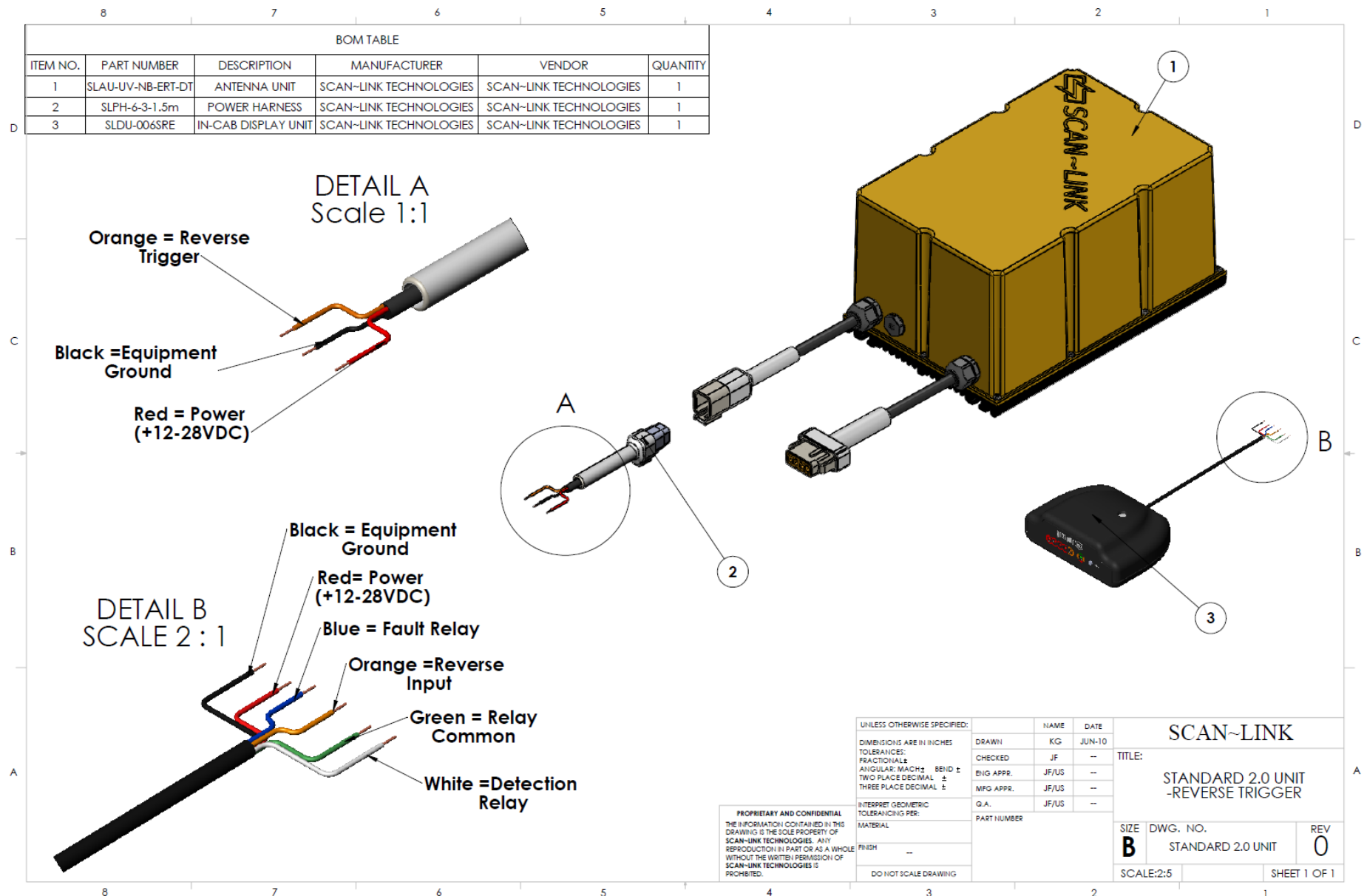
Installation Wiring Diagram: Ignition Trigger, no Alarm



Installation Wiring Diagram: Ignition Trigger with Alarm



Installation Wiring Diagram: Reverse Trigger, no Alarm



Installation Wiring Diagram: Reverse Trigger with Alarm

