



ATLAS Neurophysiology System Instructions for Use

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Revision 1.19
8/10/2017

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Published by:



Neuralynx, Inc.
105 Commercial Dr.
Bozeman, MT 59715
USA

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Revision 1.19
Use English
8/10/2017

ATLAS Neurophysiology System Instructions for



MDSS GmbH
Schiffgraben 41
30175 Hannover, Germany

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1 Document Overview

This User's Guide describes the installation and general operation of the Neuralynx ATLAS Neurophysiology System.

The information in this *User's Guide* is required for the daily operation of the ATLAS Neurophysiology System.

- General information on the intended use, known contraindications, warnings, cautions, precautions, and special skills required to use the ATLAS Neurophysiology System.
- ATLAS Neurophysiology System description, including physical and performance characteristics.
- Installation Instructions.
- Operation Instructions.
- Shutdown Instructions.
- Cleaning Instructions
- Maintenance Instructions.
- Disposal Instructions.

2 General Information

2.1 Manual Information

Table 1 Manual Information

Manual Part Number	<i>ATLAS Manual</i>
Manual Revision Number	<i>1.19</i>
Manual Revision Date	<i>8/10/2017</i>

2.2 Device Information


Table 2 Device Information

Device Part Number	REF <i>ATLAS Neurophysiology System</i>
Device Serial Number	Six character code trailing serial number symbol. For example: SN 2523

2.3 Contacting Neuralynx

If you have any questions, problems, or complaints with the ATLAS Neurophysiology System or would like to submit an RMA Request, contact Neuralynx Support for assistance.

Table 3 Neuralynx Contact Information

Email:	support@neuralynx.com
Phone:	(406) 585-4542
Fax:	(866) 585-1743
Mail:	 Neuralynx, Inc. 105 Commercial Dr. Bozeman, MT 59715 USA
Website	www.nlxneuro.com

2.4 Intended Use

The ATLAS Neurophysiology System is intended to be used for temporary (<30 days) recording and monitoring of brain electrical activity.



2.5 Special Skills Required

The ATLAS Neurophysiology System is designed to be used by Physicians, EEG Technicians, and Nurses in the neurology field. This manual assumes the user has a basic knowledge of the concepts used to record brain electrical activity.

Warning!

Federal law restricts this device to sale by or on the order of a physician.

2.6 Contraindications

There are no contraindications for use of the ATLAS Neurophysiology System.

2.7 Adverse Reactions

There are no adverse reactions to the use of the ATLAS Neurophysiology System.

3 Warnings and Safety Notices

The conventions used in this document to call out Warnings, Cautions, Precautions, and Notes are described below.

Warnings are statements that alert the user to the possibility of injury, death, or other serious adverse reactions associated with the use or misuse of the device



Warning!

Description of potential harm.

Cautions are statements that alert the user to the possibility of a problem with the device associated with its use or misuse. Such problems include device malfunction, device failure, damage to the device or damage to other property. Cautions include a **Precaution** that should be taken to avoid the hazard.



Caution!

Description of potential harm. Recommended Precaution.

Notes provide general information for standard operation.



Note!

General information for standard operation.

4 ATLAS Neurophysiology System Description

The ATLAS Neurophysiology System is a data acquisition system that allows for recording from up to 512 unique electrodes. The ATLAS Neurophysiology System consists of two components, the ATLAS Acquisition Amplifier hardware, and ATLAS or Pegasus Software (referred to as Data Acquisition Software). The Pegasus Software is the updated version of the ATLAS Software. This user manual describes setup and use of the ATLAS Acquisition Amplifier. Software operating instructions are provided separately.

4.1 ATLAS Acquisition Amplifier

The ATLAS Acquisition Amplifier contains 16 slots for ATLAS Hybrid Input Boards, ATLAS DRS-36 Boards, and ATLAS Combo Boards. The ATLAS Neurophysiology System is either configured with ATLAS Hybrid Input Boards and ATLAS DRS-36 Boards or with ATLAS Combo Boards.



Figure 4-1 ATLAS Acquisition Amplifier Configured with 8 ATLAS Hybrid Input Boards and 8 ATLAS DRS Boards







Figure 4-2 ATLAS Acquisition Amplifier Configured with 16 ATLAS Hybrid Combo Boards

4.1.1 ATLAS Hybrid Input Board and ATLAS DRS-36 Boards

Each ATLAS Hybrid Input Board performs Analog to Digital Conversion for 32 electrodes. An ATLAS Hybrid Input Board is always matched with an ATLAS DRS-36 Board. Each ATLAS DRS-36 Board performs Digital Reference Selection for its corresponding ATLAS Hybrid Input Board. Each ATLAS Hybrid Input Board and ATLAS DRS-36 Board pair consumes two slots. Because the system contains 16 slots, the maximum channel count using ATLAS Hybrid Input Boards and ATLAS DRS-36 Boards is 256 channels. Electrode Interfaces connect to the pair through the Input Connector on the ATLAS DRS-36 Board.

Table 4 ATLAS Hybrid Input Board and ATLAS DRS-36 Board Status Indicators

ATLAS Hybrid Input Board		
LED Label	LED Status	Status Description
+V HS		Positive headstage power supply operating as expected.
		Positive headstage power supply not functioning. or ATLAS Neurophysiology System Power not On.
-V HS		Negative headstage power supply operating as expected.
		Negative headstage power supply not

		functioning. or ATLAS Neurophysiology System Power not On.
+V AN		All positive analog power supplies operating as expected.
		1 or more positive analog power supplies not functioning. or ATLAS Neurophysiology System Power not On.
-V AN		All negative analog power supplies operating as expected.
		1 or more negative analog power supplies not functioning. or ATLAS Neurophysiology System Power not On.
HS Pwr		Headstage power enabled.
		Headstage power disabled.
OK S1 S2 S3 S4 S5	Blinking	ALTAS Hybrid Input Board programmed and clocking.
		ALTAS Hybrid Input Board not programmed. or ALTAS Hybrid Input Board not clocking.
ATLAS DRS-36 Board		
LED Label	LED Label	Status Description
+V HS		Positive headstage power supply operating as expected.
		Positive headstage power supply not functioning. or ATLAS Neurophysiology System Power not On.
-V HS		Negative headstage power supply operating as expected.
		Negative headstage power supply not functioning. or ATLAS Neurophysiology System Power not On.
+V AN		All positive analog power supplies operating as expected.
		1 or more positive analog power supplies not functioning. or ATLAS Neurophysiology System Power not On.
-V AN		Positive headstage power supply

		operating as expected.
		Positive headstage power supply not functioning. or ATLAS Neurophysiology System Power not On.
HS Pwr		Headstage power enabled.
		Headstage power disabled.

4.1.2 ATLAS Combo Board

The ATLAS Combo Board combines the functionality of the ATLAS Hybrid Input Board and ATLAS DRS-36 Board onto a single board, meaning the Digital Reference Selection and Analog to Digital Conversion for 32 electrodes is combined into a single slot. Because the system contains 16 slots, the maximum channel count using ATLAS Hybrid Combo Boards is 512 channels. Electrode Interfaces connect to the ATLAS Combo Board through the Input Connector.

Table 5 ATLAS Combo Board Status Indicators

ATLAS Combo Board		
LED Label	LED Status	Status Description
A Pwr		All analog power supplies operating as expected and enabled.
		1 or more analog power supplies not functioning. or Analog power not enabled.
D Pwr		All digital power supplies operating as expected.
		1 or more digital power supplies not functioning. or ATLAS Neurophysiology System Power not On.
HS Pwr		Headstage power supply operating as expected and enabled.
		Headstage power supply not functioning. or Headstage power not enabled.
HB	Blinking	ALTAS Combo Board programmed and clocking.
		ALTAS Combo Board not programmed. or ALTAS Combo Board not clocking.

Status		ALTAS Combo Board acquiring.
	Momentary	ALTAS Combo Board receiving reference command.
	Momentary	ALTAS Combo Board receiving invalid reference command.
		ALTAS Combo Board not acquiring.
Error		ALTAS Combo Board unable to acquire.
	2 Blinks	Acquisition On but Active Ground Drive disconnected.
	3 Blinks	ALTAS Combo Board FPGA max core temperature exceeded.
	4 Blinks	Software Controlled Analog Switch Network not set properly.
		No Errors.

4.1.3 ATLAS Motherboard

The ATLAS Motherboard operates the ATLAS Acquisition Amplifier. It packetizes the data from the ATLAS Hybrid Input Boards and ATLAS Combo Boards and sends it to the Data Acquisition Software and routes reference commands from the Data Acquisition Software to the proper ATLAS DRS-36 Boards and ATLAS Combo Boards in the ATLAS Acquisition Amplifier.

Table 6 ATLAS Motherboard Status Indicators

ATLAS Motherboard		
LED Label	LED Status	Status Description
15V		External power supply connected to ATLAS Acquisition Amplifier.
		External power supply disconnected from ATLAS Acquisition Amplifier.
On		Power Switch in On position.
		Power Switch in Off position.
5.5V		+5.5 power supply operating as expected.
		+5.5 power supply not operating.

-5.5V		-5.5 power supply operating as expected.
		-5.5 power supply not operating.
4.5V		+4.5 power supply operating as expected.
		+4.5 power supply not operating.
TTL Power 2/3 Power		TTL Power on connector operating as expected.
		TTL Power on connector not operating.
TTL Power 0/1 Power		TTL Power on connector operating as expected.
		TTL Power on connector not operating.

4.2 ATLAS Workstation

The ATLAS Workstation is a computer that runs the Data Acquisition Software.



Figure 4-3 ATLAS Workstation

4.3 Power Conditioner

The Power Conditioner is an uninterruptible power supply that provides power to the ATLAS Neurophysiology System. It provides up to 5 minutes of power in the event where main power is lost. The Power Conditioner also limits patient leakage currents to an acceptable level. For more information on the Power Conditioner, refer to its manual.



Figure 4-4 Power Conditioner

4.4 Detachable Parts

4.4.1 Global Reference Module

The Global Reference Module provides Global Referencing to the ATLAS Neurophysiology System. It connects to the Global Reference Connection on the ATLAS DRS Board or ATLAS Combo Board.

4.4.2 ATLAS CHET Adapter

The ATLAS CHET Adapter is an optional configuration of the ATLAS Neurophysiology System that allows up to 4 clinical headstages to interface with the ATLAS Acquisition Amplifier.

Table 7 ATLAS CHET Adapter

Part Name	Description	Part Number
ATLAS CHET Adapter	Clinical Headstage Adapter	31-0602-0028



Figure 4-5 ATLAS CHET Adapter

4.4.3 ATLAS TTL Isolator

The ATLAS TTL Isolator is an optional configuration of the ATLAS Neurophysiology System that isolates two of the four 8 bit TTL Ports on the front of the system. This device allows users to connect another device to the TTL Ports, without circumventing the safety mechanisms in the ATLAS Neurophysiology System. Without the ATLAS TTL Isolator, only Type CF medical devices can be connected to the ATLAS Acquisition Amplifier.



Warning!

Connecting electronic devices to the TTL Ports may impact patient leakage current. Always use the ATLAS TTL Isolator when connecting to the TTL Ports.

Both 8 bit ports on the ATLAS TTL Isolator are configured as Input Ports. Connect the ATLAS TTL Isolator sliding it into the connector labeled TTL I/O Port 1 and 0 or TTL I/O Port 3 and 2 on the ATLAS Acquisition Amplifier. If isolation on all four 8 bit TTL Ports is required, two ATLAS TTL Isolators are needed.

Table 8 ATLAS TTL Isolator Part Number

Part Name	Description	Part Number
ATLAS TTL Isolator	TTL Isolator	31-0604-0060



Figure 4-6 ATLAS TTL Isolator

4.4.4 ATLAS Analog Isolator

The ATLAS Analog Isolator is an optional configuration of the ATLAS Neurophysiology System that isolates 16 analog channels on the system. This device allows users to connect another device to the analog connections, without circumventing the safety mechanisms in the ATLAS Neurophysiology System. Without the ATLAS Analog Isolator, only Type CF medical devices can be connected to the analog connections on the ATLAS Acquisition Amplifier.

The ATLAS Analog Isolator connects to the ATLAS Acquisition Amplifier through its Output Connector using a standard TETH-XTN-MM Extension Cable, which is provided with the device.



Figure 4-7 ATLAS Analog Isolator Output Connector

The Input Connector on the ATLAS Analog Isolator is a standard 0.1" Shrouded Header Connector. The pinout for this connector is shown in the figure below.

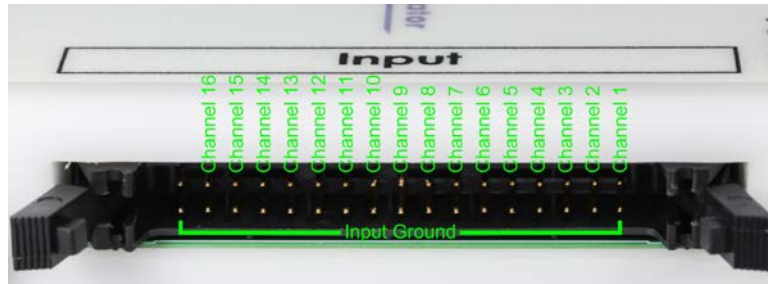


Figure 4-8 ATLAS Analog Isolator Input Connector

The ATLAS Analog Isolator offers two different Input Ranges to reduce signals down to the Input Range of the ATLAS Acquisition Amplifier ($\pm 131.072\text{mV}$). These are selectable using the switches on the top side of the device. When a switch is in the $\pm 1\text{V}$ position, the gain for that specific channel is approximately $0.11[\text{V/V}]$. When a switch is in the $\pm 10\text{V}$ position, the gain for that specific channel is approximately $0.011[\text{V/V}]$.

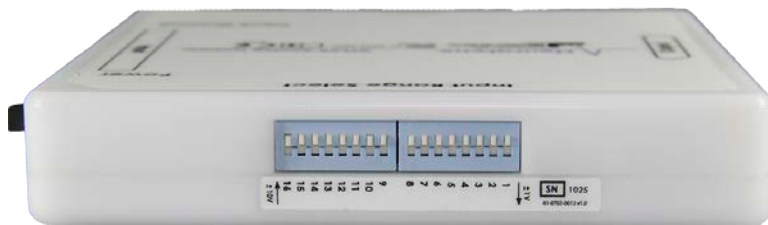


Figure 4-9 ATLAS Analog Isolator Input Range Select

When using the ATLAS Analog Isolator, its corresponding channels should be referenced against Subject Ground. The AD Channels of the ATLAS Acquisition Amplifier corresponding to the channels of the ATLAS Analog Isolator depend on which slot the ATLAS Analog Isolator is connected to on the ATLAS Acquisition Amplifier. The following table is provided to determine which AD Channel corresponds to the first channel on the ATLAS Analog Isolator.

Table 9 Starting AD Channel

Slot #	IB/DRS System		CB System	
	Board	Starting AD Channel	Board	Starting AD Channel
1	IB		CB	0
2	DRS	0	CB	32
3	IB		CB	64
4	DRS	32	CB	96
5	IB		CB	128
6	DRS	64	CB	160
7	IB		CB	192
8	DRS	96	CB	224
9	IB		CB	256
10	DRS	128	CB	288
11	IB		CB	320
12	DRS	160	CB	352
13	IB		CB	384
14	DRS	192	CB	416
15	IB		CB	448
16	DRS	224	CB	480

IB - ATLAS Hybrid Input Board
DRS - ATLAS DRS-36 Board
CB - ATLAS Combo Board

Table 10 ATLAS Analog Isolator Part Number

Part Name	Description	Part Number
ATLAS Analog Isolator	Analog Signal Isolator	31-0602-0029

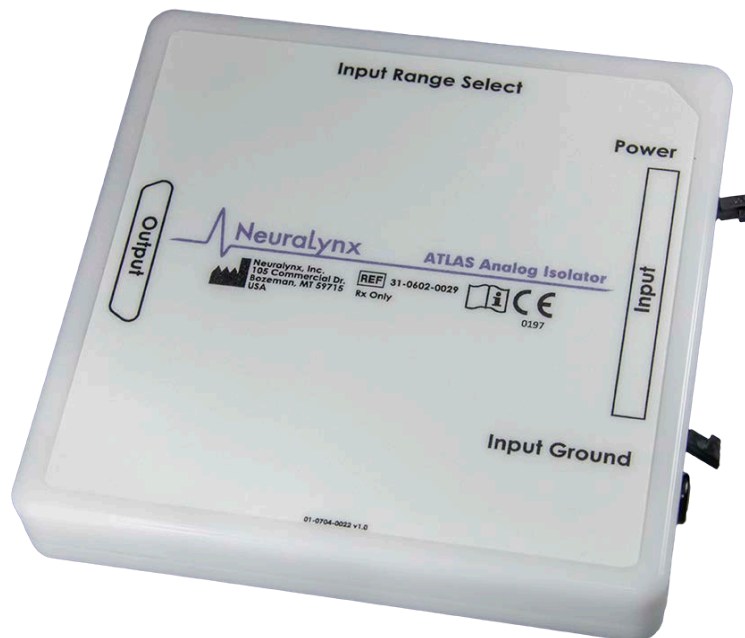


Figure 4-10 ATLAS Analog Isolator

4.4.5 Active Ground Drive

The Active Ground Drive generates the Active Ground signal based on input selected in the Data Acquisition Software.

Table 11 Active Ground Drive Part Number

Part Name	Description	Part Number
ATLAS Ground Drive	Active Ground Drive Amplifier	31-0604-0100



Figure 4-11 Active Ground Drive

4.4.6 TETH-XTN-MM Extension Cable

Extension Cables are used to connect electrode interfaces with the ATLAS Neurophysiology System. These are listed in the table below.

Table 12 Extension Cable Part Numbers

Part Name	Description	Part Number
TETH-XTN-MM-1 Extension Cable	1 Meter Extension Cable	31-0613-0002
TETH-XTN-MM-2 Extension Cable	2 Meter Extension Cable	31-0613-0003
TETH-XTN-MM-5 Extension Cable	5 Meter Extension Cable	31-0613-0004
TETH-XTN-MM-8 Extension Cable	8 Meter Extension Cable	31-0613-0005



Figure 4-12 TETH-XTN-MM Extension Cable

Two Extension Cables are combined to create single connection to the electrode interface. The Combined Extension Cables ensures a proper connection between the electrode interface and the ATLAS Neurophysiology System.



Figure 4-13 Combined Extension Cables

4.4.7 Tether Interconnect

A Tether Interconnect can be used to connect multiple extension cables together.

Table 13 Tether Interconnect Part Number

Part Name	Description	Part Number
Tether Interconnect	Cable Connector	31-0602-0004



Figure 4-14 Tether Interconnect

4.4.8 ATLAS Patient Event Marker

The ATLAS Patient Event Marker is an optional configuration of the ATLAS Neurophysiology System that allows the patient to mark an event in the Data Acquisition Software. The ATLAS Patient Event Marker provides isolation from the patient connections of the ATLAS Acquisition Amplifier to ensure it and its cabling has no impact on the quality of the recordings.

The first bit of the first port is driven by the push button. Connect the ATLAS Patient Event Marker sliding it into the connector labeled TTL I/O Port 1 and 0 or TTL I/O Port 3 and 2 on the ATLAS Acquisition Amplifier.

Table 14 ATLAS Patient Event Marker Part Number

Part Name	Description	Part Number
ATLAS Patient Event Marker	Patient Event Marker	Patient Event Marker



Figure 4-15 ATLAS Patient Event Marker

4.4.9 ATLAS Headbox

The ATLAS Headbox allows electrodes with 1.5mm Touch Proof connections to interface with the ATLAS Neurophysiology System. For more information on the ATLAS Headbox, refer to the ATLAS Headbox Instructions for Use.

4.4.10 ATLAS HC Headbox

The ATLAS HC Headbox allows the CA-105 **waveguard™** EEG Cap and electrodes with 1.5mm Touch Proof connections to interface with the ATLAS Neurophysiology System. For more information on the ATLAS HC Headbox, refer to the ATLAS HC Headbox Instructions for Use.

4.4.11 ATLAS NK Headbox

The ATLAS NK Headbox allows Mini Flat Junction Boxes by Nihon Kohden to interface with the ATLAS Neurophysiology System. For more information on the ATLAS NK Headbox, refer to the ATLAS NK Headbox Instructions for Use.

4.4.12 HS-10-CHET-A 1.0

The HS-10-CHET-A 1.0 is a clinical headstage that allows one Ad-Tech Tail Electrode (usually consisting of up to 9 electrodes) to interface with the ATLAS Neurophysiology System. For more information on the HS-10-A, refer the HS-10-CHET-A 1.0 and HS-18-CHET-A 1.0 Instructions for Use.

4.4.13 HS-18-CHET-A 1.0

The HS-18-CHET-A 1.0 is a clinical headstage that allows one Ad-Tech Tail Electrode (usually consisting of up to 16 electrodes) to interface with the ATLAS Neurophysiology System. For more information on the HS-18-A, refer to the HS-10-CHET-A 1.0 and HS-18-CHET-A 1.0 Instructions for Use.

4.4.14 HS-10-CHET-Omni 1.0

The HS-10-CHET-Omni 1.0 is a clinical headstage that allows one Ad-Tech Behnke Fried Electrode (usually consisting of 9 micro electrodes) to interface with the ATLAS Neurophysiology System. For more information on the HS-10-CHET-Omni 1.0, refer to the HS-10-CHET-Omni 1.0 Instructions for Use.



Warning!

Connecting Clinical Headstages to anything other than the ATLAS CHET Adapter may cause excessive patient leakage currents. Only connect Clinical Headstages to the ATLAS CHET Adapter.

4.4.15 ADPT-NKSS-DRS-A and ADPT-NKSS-DRS-BCD adapter cables

The ADPT-NKSS-DRS adapter cables allow signals from an electrode interface, such as the ATLAS Headbox, to be recorded by not only the ATLAS Neurophysiology System but also the Nihon Kohden Corporation JE-120A Amplifier. The ADPT-NKSS-DRS shares the buffered outputs from the electrode interface and routes them to both systems to be digitized. The ADPT-NKSS-DRS is strictly a passive device, it has no effect on the signals that pass through it. For more information on the ADPT-NKSS-DRS, refer to the ADPT-NKSS-DRS Instructions for Use.

4.4.16 ATLAS TPSS Cable

The ATLAS TPSS Cable allows signals from an electrode interface, such as the ATLAS Headbox, to be recorded by not only the ATLAS Neurophysiology System but also any other FDA cleared or CE Marked neurophysiology recording system. The ATLAS TPSS Cable shares the outputs from the electrode interface and splits them to both systems to be digitized. The ATLAS TPSS Cable is strictly a passive device, it has no effect on the signals that pass through it. For more information on the ATLAS TPSS Cable, refer to the ATLAS TPSS Cable Instructions for Use.

4.4.17 ATLAS TOPHAT Adapter cable

The ATLAS TOPHAT Adapter cable allows signals from a Micromed JB TOPHAT electrode interface to be recorded by the ATLAS Neurophysiology System. For more information on the ATLAS TOPHAT Adapter, refer to the ATLAS TOPHAT Adapter Instructions for Use.

4.5 Physical Characteristics

Table 15 Physical Characteristics

ATLAS Acquisition Amplifier Dimensions	590mm x 495mm x 470mm
ATLAS Acquisition Amplifier Weight	~ 14.7kg
ATLAS Workstation Dimensions	203mm x 525mm x 444mm
ATLAS Workstation Weight	~ 21.1kg
Monitor Dimensions	454mm x 694mm x 87mm
Monitor Weight	9.5kg
Power Conditioner Dimensions	149mm x 451mm x 205mm
Power Conditioner Weight	~ 20.4kg
ATLAS Cart Dimensions (including Monitor)	711mm x 940mm x 1931mm
ATLAS Cart Weight	~ 68kg

4.6 Performance Characteristics

Table 16 Performance Characteristics

Channels	Up to 512 channels per system.
Sampling Resolution	24 bit A/D Conversion
Sample Frequency	16,000 to 40,000 Samples per second per channel
AC Input Range	±131.072mV

DC Input Range	> $\pm 1000\text{mV}$
Hybrid Filter Bandwidth	DC to 5600Hz
Typical Input Referred Noise (0.1Hz to 8000Hz)	$1.3\mu\text{V}_{\text{RMS}}$
Typical Input Referred Noise (0.1Hz to 100Hz)	$0.25\mu\text{V}_{\text{RMS}}$
Typical Common Mode Rejection Ratio at 50Hz	-114dB
Typical Common Mode Rejection Ratio at 60Hz	-114dB
Number of References	Up to 8 Local References Up to 8 Global References
Measurement Accuracy	Voltage - $\pm 1\%$
Camera Resolution	1920 x 1080
Camera Frame Rate	30 frames per second

4.7 Classifications

Table 17 Device Classifications

Ingress Rating	IPX0
Electrical Classification	Class 1, Continuous Operation
Applied Parts Rating	Type CF

4.8 Isolation from Supply Mains

The ATLAS Neurophysiology System provides three means of isolation from the Supply Mains for patient safety.


**Warning!**

Modifying the ATLAS Neurophysiology System may disrupt the safety features in the device. Neuralynx does not guarantee the safety and performance of an ATLAS Neurophysiology System that has been modified.

5 Markings

Table 18 Device Markings

	Indicates the Neuralynx catalog number so the medical device can be identified: <i>ATLAS Neurophysiology System</i>
	Indicates the Neuralynx serial number so that the specific medical device can be identified: <i>AE2523</i>
	Indicates the medical device manufacturer: <i>Neuralynx, Inc.</i> <i>105 Commercial Dr.</i> <i>Bozeman, MT 59715</i> <i>USA</i>
	Indicates the medical device year of manufacture: <i>2017</i>
	Indicates the authorized representative in the European Community: <i>MDSS GmbH</i> <i>Schiffgraben 41</i> <i>30175 Hannover, Germany</i>
	Consult the instructions for use.
	CE Marking of conformity
	Caution or Warning

	Type CF Applied Part.
Rx Only	Caution: Federal law restricts this device to sale by or on the order of a physician.

6 Setup Procedure

6.1 Hardware Setup Instructions

The following instructions are provided to show how to connect the major components of the ATLAS Neurophysiology System, such as the ATLAS Acquisition Amplifier, ATLAS Workstation with Monitor, and Power Conditioner. It will show in less detail how to connect some of the components listed in **Section 4.4 Detachable Parts**. For more information on a specific component listed in **Section 4.4 Detachable Parts**, refer to that component's individual Instructions for Use. Contact Neuralynx if more information is required.

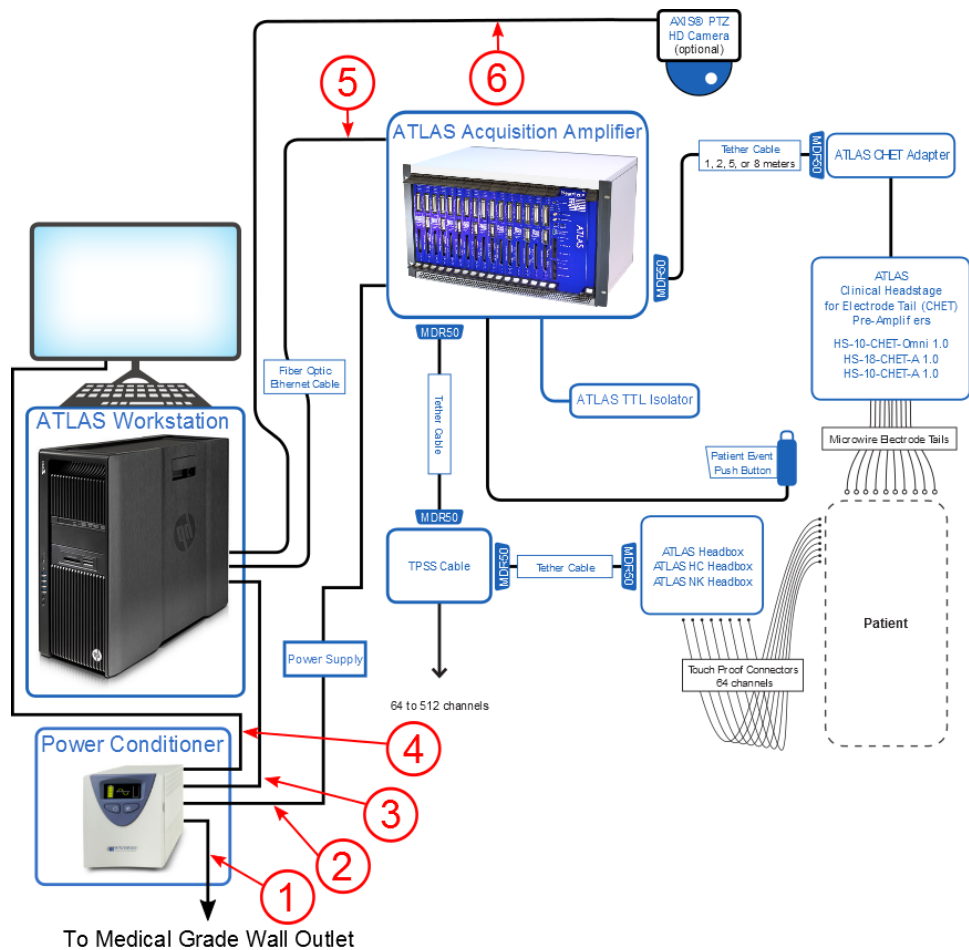


Figure 6-1 General System Setup (ATLAS Cart intentionally not referenced)

6.1.1 Callout #1 – Connect the Power Conditioner Input Power Cable

Connect the power cable provided with the Power Conditioner to the input connector on the back of the Power Conditioner. Connect the other end of the power cable to a medical grade power outlet.

6.1.2 Callout #2 – Connect the ATLAS Acquisition Amplifier Power Supply

Connect the ATLAS Acquisition Amplifier Power Supply to an open outlet with a green dot on the back of the Power Conditioner. Connect the other end of the ATLAS Acquisition Amplifier Power Supply to the connector labeled +15V on the back of the ATLAS Acquisition Amplifier. Verify the +15V Status Indicator on the ATLAS Acquisition Amplifier illuminates.



Caution!

Connecting any power supply to the ATLAS Acquisition Amplifier other than the power supply provided by Neuralynx may damage the ATLAS Acquisition Amplifier. Only use the power supply provided by Neuralynx to power the ATLAS Acquisition Amplifier.

6.1.3 Callout #3 – Connect the ATLAS Workstation Power Cable

Connect the power cable provided with the ATLAS Workstation to an open outlet on the back of the Power Conditioner. Connect the other end of the power cable to the input power connector on the ATLAS Workstation.

6.1.4 Callout #4 – Connect the Monitor Power Cable

Connect the power cable provided with the ATLAS Workstation Monitor to an open outlet on the back of the Power Conditioner. Connect the other end of the power cable to the input power connector on the ATLAS Workstation Monitor.

6.1.5 Callout #5 – Connect the ATLAS Acquisition Amplifier Data Cable

Connect the fiber optic Ethernet cable to the socket labeled Fiber Optic Data Link 1 on the back of the ATLAS Acquisition Amplifier. Connect the other end of the fiber optic Ethernet cable to the socket labeled 1 on the fiber optic Ethernet card in the ATLAS Workstation.



Caution!

The fiber optic Ethernet cable is fragile and can break if not handled properly. Handle the fiber optic Ethernet cable with care and do not touch its ends.

6.1.6 Callout #6 – Connect the Camera

Connect the power cable provided with the Camera to an open outlet on the back of the Power Conditioner. Connect the other end of the power cable to the input power connector on the Camera PoE. Connect the first standard Ethernet cable to the Ethernet Port on the back of the ATLAS Workstation. Connect the other end of Ethernet cable to the Camera PoE. Connect the first standard Ethernet cable to the Ethernet Port on the Camera PoE. Connect the other end of Ethernet cable to the Camera.

6.2 Camera Configuration Instructions

After the hardware has been setup properly, use the following instructions to configure the camera to stream data to the Data Acquisition Software.

Table 19 Camera Setup Instructions

	1. Use the Axis setup software to determine the IP address of the camera.
	2. Log into the camera setup software by navigating to the IP address in a web browser.
	3. Under Basic Setup -> 2 TCP/IP - Setup a static IPv4 address on the same subnet as the Pegasus PC X.X.X.X.
	4. Under Video & Audio -> Video Stream A. Image: 1. Resolution: 1280x720 2. Rotate Image: 180 if camera dome away from ground, 0 if toward ground. B. Audio: 1. Enable audio: Checked
	5. Under Video & Audio -> Stream Profiles, Add a 2 new profiles with the following settings: A. Profile 1 name: B. PegasusPreview C. Video encoding: 1. MJPEG D. Image: 1. Resolution: 1280x720 E. Audio: 1. Audio Stream: Checked and set to On F. Profile 2 name: 1. PegasusRecord G. Video encoding: 1. H.264 H. Image: 1. Resolution: 1280x720 I. Audio: 1. Audio Stream: Checked and set to On J. H.264: 1. Rate Control: Checked and set to Variable bit

	rate
	6. Under Video & Audio -> Audio Settings A. Audio Channels -> Audio mode: Simplex, microphone only B. Audio Input -> Source: Microphone 1. Microphone Power: checked 2. Encoding: G711 μ -law 3. Sample rate: 8KHz 4. Bit Rate: 64Kbits/s
	7. Under System Options -> Security -> Users A. Add a new user: root B. pwd: cheetah under user group Administrator C. User Settings: Enable anon viewer login: checked D. Enable basic setup: checked
	8. Under System Options -> Security -> ONVIF A. Add a new user: root B. pwd: pegasus under user group Administrator
	9. Save settings and exit browser.

7 Start-up Procedure

7.1 Pre-use Checklist

The following check list should be used to ensure the ATLAS Neurophysiology System is ready for use prior to each recording session.

Table 20 Pre-use Checklist

	ATLAS Neurophysiology System and components enclosures are free of any deformations or cracks.
	ATLAS Neurophysiology System and components labeling are intact, ensuring the devices have not been tampered with.
	ATLAS Neurophysiology System cabling is free of any deformations, nicks, cuts or abrasions.
	ATLAS Neurophysiology System and components connectors are all intact.

7.2 Start-up Instructions

The ATLAS Neurophysiology System is configurable and each user's setup is completely unique. The following instructions are provided to give a general description of how to connect the ATLAS Neurophysiology System. For more information on a specific component listed in **Section 4.4 Detachable Parts**, refer to that component's individual Instructions for Use. The specific setup you use should be recorded so you can repeat it continually. Contact Neuralynx if more information is required.



Note!

If multiple cables are being used, use your institution's own method for labeling the cables for distinction.



Note!

Use your institution's own method of recording the ATLAS Neurophysiology System Setup and electrode connections.



Warning!

When performing simultaneous recordings, connecting the ATLAS Neurophysiology System to non FDA Cleared or non CE Marked EEG Systems may impact patient leakage current. Only connect the ATLAS Neurophysiology System to other FDA Cleared or CE Marked EEG Systems.



Warning!


Touching earth ground and the patient simultaneously may cause excessive patient leakage current. Do not touch the patient and the ATLAS Acquisition Amplifier Chassis simultaneously.



Caution!

Using damp or wet electronics may damage the equipment or cause patient harm. Ensure the ATLAS Neurophysiology System is completely dry before use.

Table 21 Startup Instructions

	<p>1. Turn the Power Conditioner ON by pressing and holding the On button until the following image is displayed on the screen:</p>  <p>Figure 7-1 Power Conditioner ON</p>
	<p>2. Turn the ATLAS Workstation and Monitor and log into Windows.</p>
	<p>3. Turn the ATLAS Acquisition Amplifier On and allow it to boot.</p>

4.

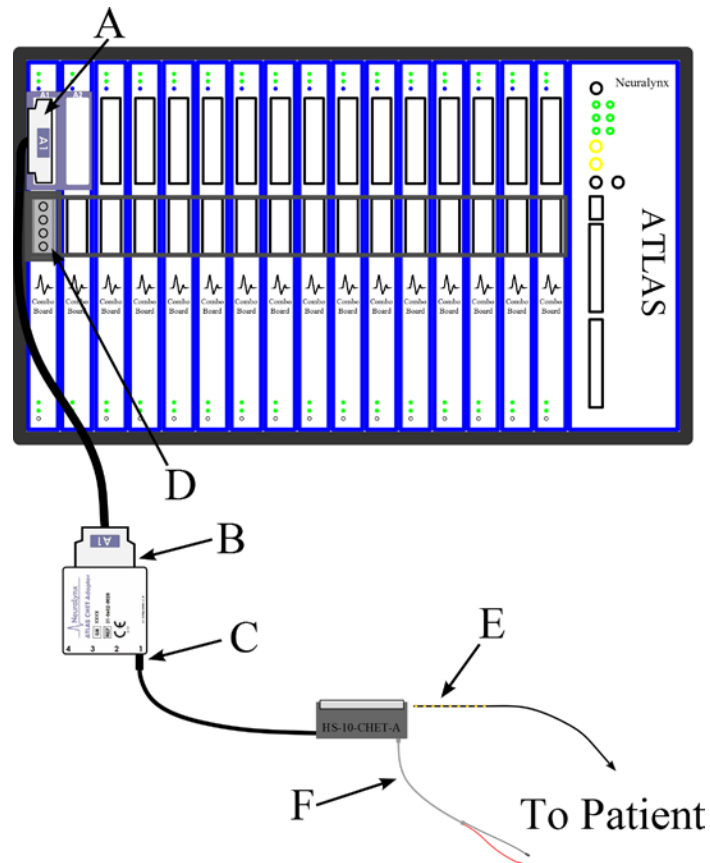


Figure 7-2 Example System Setup

- A. Connect a TETH-XTN-MM Extension Cable to the Input Connector of the first Combo Board in the ATLAS Acquisition Amplifier.
- B. Connect the other end of the TETH-XTN-MM Extension Cable to the ATLAS CHET Adapter.
- C. Connect the HS-10-CHET-A 1.0 to Port 1 on the ATLAS CHET Adapter.
- D. Verify the Active Ground Drive is connected to the open connector on the Global Reference Module, located at the first Combo Board in the ATLAS Acquisition Amplifier. Port 1 on the ATLAS CHET Adapter should illuminate green the Active Ground Drive was not already connected.
- E. Connect the electrodes to the HS-10-CHET-A 1.0.
- F. Configure the Patient Grounding Scheme.

5. Secure the HS-10-CHET-A 1.0 for recording.

6. On the ATLAS Workstation, boot the Pegasus using the Pegasus User's Manual.

	<p>7. Configure Pegasus to your desired settings using the Pegasus User's Manual. Settings include but are not limited to:</p> <ul style="list-style-type: none"> Input Range Filtering Referencing Active Ground Drive
	<p>8. Once Pegasus is configured to your desired settings, begin recording by selecting the Record Button in the Pegasus Software.</p>

8 Operating Instructions

Once the Record Button in the Data Acquisition Software has been selected, none of the Data Acquisition Software configurations can be changed without stopping recording. If during recording you notice a change in the signal quality, ensure all electrode connections are still fully connected. If this does not solve the problems, refer to the Troubleshooting Section of this manual.

9 Shutdown Procedure

9.1 Shutdown Instructions

The Data Acquisition Software should be shutdown correctly to ensure all open data recording files are properly closed. The following instructions are provided and should be followed each time recording is complete. The ATLAS Workstation and ATLAS Acquisition Amplifier can remain On after these steps have been conducted.

Table 22 Shutdown Instructions

	1. In the Data Acquisition Software select the Stop Recording Button.
	2. In the Data Acquisition Software select the Stop Acquisition Button.
	3. Close the Data Acquisition Software. This is when all the data files are closed.
	4. Disconnect the HS-10-CHET-A 1.0 and replace all equipment in its original container.



Caution!

Closing the Data Acquisition Software incorrectly may result in data corruption. Follow the Shutdown Procedure to ensure data quality.

10 Cleaning Procedure

If needed, the surface and cables of the ATLAS Neurophysiology System can be cleaned with disinfectant wipes. The ATLAS Neurophysiology System should be inspected after each recording to determine if cleaning is required.

**Warning!**

Using damp or wet electronics may damage the equipment or cause patient harm. Ensure the ATLAS Neurophysiology System is completely dry before use.

**Caution!**

Do not fully immerse the ATLAS Neurophysiology System in cleaning fluid. Disinfect by wiping only.

**Warning!**

Disinfectants can be harmful if absorbed through the skin. Avoid contact with eyes, skin, and clothing.

**Caution!**

Steam or ETO Sterilization may cause permanent damage to the ATLAS Neurophysiology System. Do not sterilize the ATLAS Neurophysiology System.

11 Maintenance

The ATLAS Neurophysiology System is designed to require no maintenance over the life of the device. Periodically the ATLAS Neurophysiology System should be inspected to ensure it still functions appropriately. Neuralynx recommends carrying out the following Inspection Procedure every 3 to 6 months or every 3 to 5 patients.

11.1 Inspection Procedure

The following are instructions for inspecting the ATLAS Neurophysiology System.

Table 23 Inspection Procedure

	ATLAS Neurophysiology System and components enclosures are free of any deformations or cracks.
	ATLAS Neurophysiology System and components labeling are intact, ensuring the devices have not been tampered with.
	ATLAS Neurophysiology System cabling is free of any deformations, nicks, cuts or abrasions.
	ATLAS Neurophysiology System and components connectors are all intact.

If you find any problems with the ATLAS Neurophysiology System, contact Neuralynx Support.

12 Troubleshooting Procedure

The following is a list to guide you to the possible cause of some conditions you experience. If your condition is not on this list or you still have problems, contact Neuralynx Support.

Table 24 Troubleshooting Table

Condition	Possible Causes
Poor Signal Quality.	<ul style="list-style-type: none">• Cables or connections not fully seated.• Cabling near noise source.• Cabling on top of ATLAS Workstation or Power Conditioner.• ATLAS Acquisition Amplifier near noise source.• ATLAS Cart not properly grounded.• Patient Ground configuration incorrect.• Reference in Data Acquisition Software not properly configured.• Data Acquisition Software Configuration File incorrect.
Data Acquisition Software Channel numbers don't make sense.	<ul style="list-style-type: none">• Data Acquisition Software Configuration File incorrect.
Missing channels.	<ul style="list-style-type: none">• Cables or connections not fully seated.• Cables or connections damaged.• Debris in connections.
ATLAS Acquisition Amplifier rattles when rolling ATLAS Cart.	<ul style="list-style-type: none">• ATLAS Acquisition Amplifier damaged.

13 Environmental Protection

This ATLAS Neurophysiology System contains electronic components that can pollute water and air resources without proper disposal or recycling. Dispose the ATLAS Neurophysiology System using your local electronic waste disposal services. If your institution does not have a means to properly dispose electronic waste, contact Neuralynx Support for assistance.


14 Electromagnetic Compatibility

Guidance and manufacturer's declaration – electromagnetic emissions		
The ATLAS Neurophysiology System is intended for use in the electromagnetic environment specified below. The customer or the user of the ATLAS Neurophysiology System should assure that it is used in such an environment.		
Emissions test	Compliance	Electromagnetic environment - Guidance
RF emissions CISPR 11	Group 1	The ATLAS Neurophysiology System uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class A	The ATLAS Neurophysiology System is suitable for use in all establishments other than domestic and those directly connected to the public low-voltage power supply network that supplies buildings used for domestic purposes.
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/flicker emissions IEC 61000-3-3	Complies	

Guidance and manufacturer's declaration – electromagnetic immunity			
The ATLAS Neurophysiology System is intended for use in the electromagnetic environment specified below. The customer or the user of the ATLAS Neurophysiology System should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - Guidance
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30 %.
Electrical fast transient/burst IEC 61000-4-4	± 2 kV for power supply lines ± 1 kV for input/output lines	± 2 kV for power supply lines ± 1 kV for input/output lines	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	± 1 kV line(s) to line(s) ± 2 kV line(s) to earth	± 1 kV line(s) to line(s) ± 2 kV line(s) to earth	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions and voltage variations on power supply input lines. IEC 61000-4-5	<5 % U_T (>95 % dip in U_T) for 0,5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 s	<5 % U_T (>95 % dip in U_T) for 0,5 cycle 40 % U_T (60 % dip in U_T) for 5 cycles 70 % U_T (30 % dip in U_T) for 25 cycles <5 % U_T (>95 % dip in U_T) for 5 s	Mains power quality should be that of a typical commercial or hospital environment. If the user of the ATLAS Neurophysiology System requires continued operation during power mains interruptions, it is recommended that the ATLAS be powered from an uninterruptible power supply or battery.
Power frequency (50/60 Hz)	3 A/m	3 A/m	Power frequency magnetic fields should be at levels

magnetic field IEC 61000-4-8			characteristic of a typical location in a typical commercial or hospital environment.
NOTE U_T is the a.c. mains voltage prior to application of the test level			

Guidance and manufacturer's declaration – electromagnetic immunity			
The ATLAS Neurophysiology System is intended for use in the electromagnetic environment specified below. The customer or the user of the ATLAS Neurophysiology System should assure that it is used in such an environment.			
Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - Guidance
Conducted RF IEC 61000-4-3 Radiated RF IEC 61000-4-3	3 Vrms 150 kHz to 80 MHz 3 V/m 80 MHz to 2,5 GHz	3 Vrms 3 V/m	Portable and mobile RF communications equipment should be used no closer to any part of the ATLAS Neurophysiology System, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter. Recommended separation distance $d = 1.2 \sqrt{P}$ $d = 1.2 \sqrt{P}$ $d = 3.2 \sqrt{P}$ where P is the maximum output power rating of the transmitter in Watts (W) according to the transmitter manufacturer and d is the recommended separation distance in meters (m). Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, ^a should be less than the compliance level in each frequency range. ^b Interference may occur in the vicinity of equipment marked with the following symbol:

			
<p>NOTE 1 At 80 Mhz and 800 MHz, the higher frequency range applies.</p> <p>NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.</p> <p>^a Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the ATLAS Neurophysiology System is used exceeds the applicable RF compliance level above, the ATLAS Neurophysiology System should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as re-oriented or relocating the ATLAS Neurophysiology System.</p> <p>^b Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.</p>			

Recommended separation distances between portable and mobile RF communications equipment and the ATLAS Neurophysiology System

The ATLAS Neurophysiology System is intended for use in the electromagnetic environment in which radiated RF disturbances are controlled. The customer or the user of the ATLAS Neurophysiology System can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communication equipment (transmitters) and the ATLAS Neurophysiology System as recommended below, according to the maximum output power of the communications equipment.

Rated maximum output power of transmitter W	Separation distance according to frequency of transmitter m		
	150 kHz to 80 MHz	80 MHz to 800 MHz	800 MHz to 2,5 GHz
	$d = 1,2\sqrt{(P)}$	$d = 1,2\sqrt{(P)}$	$d = 2,3\sqrt{(P)}$
0,01	0,12	0,12	0,23
0,1	0,38	0,38	0,73
1	1,2	1,2	2,3
10	3,8	3,8	7,3
100	12	12	23

For transmitters rated at a maximum output power not listed above, the recommended separation distance d in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where P is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

NOTE 1 At 80 Mhz and 800 MHz, the separation distance for the higher frequency range applies.

NOTE 2 These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects and people.