



Course Workbook

1st Edition

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SUCCEED IN THIS COURSE

Over the past year, I've created several training courses for my students. As I look back at my past students I've pinpointed three things that make my students successful:

1. Access the program, watch the videos three times, and comment on the videos. The action of watching the videos and engaging with me and fellow students will naturally increase the amount of information you retain.
2. Work through this workbook. This workbook was designed to help you retain key pieces of information that have a direct impact on your performance as a BAS professional. As you move through each lesson, I will ask you questions in the workbook that will help you to further expand your knowledge.
3. Attend the group coaching calls. These calls are your opportunity to interact with your instructor (me) and ask questions related to BAS.

Don't skimp on these three actions. The reality is learning anything takes work. Fortunately for you, I've condensed that learning into the shortest time possible.

When you follow the three steps above you will see massive results as you work through this course.

Remember, I am here for you at any time via the comments section and group coaching calls.

I look forward to hearing about your success story.

To your success,

-Phil



PART 1: CORE KNOWLEDGE

In Part 1 we will discuss the core information you need to know as a BAS Professional. Part 1 includes the following modules:

- Module 1: Overview of Building Automation Systems
- Module 2: Building Automation Hardware
- Module 3: Building Automation Servers and Clients
- Module 4: BAS Points
- Module 5: User Interfaces
- Module 6: Building Automation System Architectures
- Module 7: Control System Types
- Module 8: Common Control Modes
- Module 9: Building Automation System Protocols

As you move throughout this Part of the course I want you to think about the following questions:

- When might I use this information?
- How might I use this information?
- Who will I be explaining this information to?

Now, I realize for some of you these may be questions you can't answer yet (or at least you think you can't). I challenge you to try. In BAS context is everything, the best skill you can have is knowing how to apply the right concept to the right problem.

I know you can do this and if you approach your learning in this manner, you will be lightyears ahead of your peers and competition. Don't worry I'm behind you every step of the way!

Let's do this!



MODULE 1: OVERVIEW OF BUILDING AUTOMATION SYSTEMS

In this module we will be discussing the fundamental question, *What is a BAS?*. This module's lesson is:

- Lesson 1: What is a BAS?

Ask a dozen professionals what a BAS is, and you'll get a dozen different answers. The reality is a lot of people think they know what a BAS is but they don't.

This module is the bedrock of everything else. Get this module right, and you'll see amazing results, ignore this module and...

Well, let's just say there's a ton of shoddy BAS installs from people who thought they knew the value of a BAS.

You're not going to be one of those people!



M1 Lesson 1: What is a BAS?

Lesson Objectives:

- Describe what a BAS is and what it's used for

What is the difference between a control system and a BAS?

What is the main purpose of a BAS?



MODULE 2: BUILDING AUTOMATION HARDWARE

A BAS consists of several moving pieces. In this module, we will be discussing the parts and pieces that make up a BAS. This module's lessons are:

- Lesson 1: Supervisory Devices
- Lesson 2: Field Trunks
- Lesson 3: Field Controllers
- Lesson 4: Input Devices
- Lesson 5: Output Devices

In this module, I'll be taking you through all the different parts of a BAS. But it's more than that. As I move through each of the different parts and pieces, I want you to think of the relationships between the different devices.

I think you would be shocked how many "BAS veterans" I run into who interchange supervisory devices and field controllers like they are the same thing (which they aren't).

You won't be making those mistakes because, by the time you finish this module, you will have a solid understanding of what goes where and why...

Let's dive in.



M2 Lesson 1: Supervisory Devices

Lesson Objectives:

- Describe the main purpose of a supervisory device
- Understand how a supervisory device operates

What is the main purpose of a supervisory device?

Can you run a building simply off a supervisory device and field controllers?

What capabilities does a supervisory device have?



M2 Lesson 2: Field Trunks

Lesson Objectives:

- Explain why we use field trunks
- Describe what a field trunk is

What is a field trunk used for?

How do field trunks work?

What are the three main types of field trunks you will encounter?

What are the four mistakes that are made with field trunks? Can you provide an example of each?



M2 Lesson 3: Field Controllers

Lesson Objectives:

- Describe what a field controller is
- Explain what a field controller is used for

What are the four main components of a field controller?

What is the purpose of a field controller?

How does a field controller work?

Describe a control loop

What are the three main types of field controllers?



M2 Lesson 4: Input Devices

Lesson Objectives:

- Explain what inputs are used for
- Describe what inputs are

What are the five types of inputs?

Can you provide an example of each type of input?



M2 Lesson 5: Output Devices

Lesson Objectives:

- Describe the different types of outputs
- Explain what outputs are used for

What are the four types of outputs?

Can you provide an example of each type of output?



MODULE 3: BUILDING AUTOMATION SERVERS AND CLIENTS

In this module we will discuss the different types of servers you will be working with throughout your BAS career. This module's lessons are:

- Lesson 1: What is a Server?
- Lesson 2: Web Server
- Lesson 3: Application Server
- Lesson 4: Database Server
- Lesson 5: Clients
- Lesson 6: Operator Work Station

It used to be that all you had to worry about was a simple server and a dedicated client.

Oh, how things have changed, now you have all kinds of services, and with the introduction of HTML/5 (which honestly is a buzzword BAS companies use to make their standard UI's sound sexier), you now need to understand web servers as well.

Don't worry though, by the time you finish this module you will know what you need to know about servers. Heck, you'll know enough to trip up your co-workers and win a free beer at the bar!

Let's get 'er done!



M3 Lesson 1: What is a Server?

Lesson Objectives:

- Explain what a server is used for
- Describe how client-server architecture works

What is the purpose of a server?

What are the two main physical forms of servers?

What are the three main types of servers?

How does client-server architecture work?



M3 Lesson 2: Web Server

Lesson Objectives:

- Describe what a web server is
- Explain what a web server is used for

What is a web server?

What are the three purposes of web servers?

How does a web server work?

When folks say web servers have resources what do they mean?

Does the server or client request resources?

Where are these resources stored?



M3 Lesson 3: Application Server

Lesson Objectives:

- Describe what an application server is
- Explain what an application server is used for

What is an application server?

Why do we use application servers instead of simply connecting to the server's desktop?

What are services?

Why are services important?



M3 Lesson 4: Database Server

Lesson Objectives:

- Describe what a database server is
- Explain what a database server is used for

What are the two main types of databases?

How does a database server work?

Why would you want a dedicated database server?

What are the downsides of having a dedicated database server?



M3 Lesson 5: Clients

Lesson Objectives:

- Describe what a client is
- Explain what clients are used for

What are the two main types of client machines?

What is a client machine used for?

How does a client machine work?

What are the three main ways a client machine connects to a server?



M3 Lesson 6: Operator Workstation

Lesson Objectives:

- Describe what an operator workstation is
- Explain why we would use operator workstations

What is an operator workstation?

What is the difference between a client and an operator workstation?

How does a thick client function?

What are the differences between a thick and thin client?

Does an operator workstation have to be a thick client?



MODULE 4: BAS POINTS

In this module, we will discuss the all the little nuances of points. This module's lessons are:

- Lesson 1: What are BAS Points?
- Lesson 2: Trends
- Lesson 3: Alarms
- Lesson 4: Point Naming Strategies

Points and the capabilities they have are one of the most underutilized and misunderstood aspects of a BAS. As you move through your career, you will be shocked by how many Fortune 100 companies have 40,000 unacknowledged alarms, no naming standards, and barely trend anything.

Show me someone who doesn't see the value in a BAS and I'll show you a BAS that isn't using trending, alarming, or naming standards (at least not using them right).

By the end of this module, you'll understand how all of the capabilities should work.

Ready, set, GO!



M4 Lesson 1: What are BAS Points?

Lesson Objectives:

- Describe what a BAS Point is
- Explain what BAS points are used for

What are the two types of BAS points?

What are the three types of physical input points?

What are the three types of physical output points?

What are the three types of logical input points?

What are the three types of logical output points?

What type of point is used for a setpoint?

What are properties?

Why are properties used?



M4 Lesson 2: Trends

Lesson Objectives:

- Describe what the different types of trends are
- Explain how trends work

What are the two types of trends?

What are the two ways of storing trends?

What are the two methods of transferring trends to the database?

When would you want to use a CoV Trend? Why?

When would you want to use an interval Trend? Why?

What is a trend object?

Where does the trend object exist?



M4 Lesson 3: Alarms

Lesson Objectives:

- Describe what alarms are
- Explain how alarms are used
- Explain how alarms work

What is an alarm?

Why would you use an alarm?

How do you avoid having nuisance alarms?

What triggers can you use to enable or disable alarms?

Where is the alarm object stored?



M4 Lesson 4: Point Naming Strategies

Lesson Objectives:

- Describe what a point naming strategy is?
- Why would you want to have a point naming strategy?

How do you start a point naming strategy?

What are the four aspects of a good naming strategy?

How can you build a naming strategy for a building?

How can you design a naming strategy that will scale throughout a campus?



MODULE 5: USER INTERFACES

In this module, we will discuss the main thing the customer cares about, user interfaces! This module's lessons are:

- Lesson 1: What is a User Interface?
- Lesson 2: Reports
- Lesson 3: Graphics
- Lesson 4: Schedules

Despite all the hype, all the marketing, all the buzz, in my experience there are really only two things customers tend to care about.

Can I purchase my BAS from other manufacturers than just you? And...

What do your user interfaces look like?

Now you may be like some BAS professionals who only think of graphics when they hear the phrase user interface. But there is so much more to a user interface than simply graphics.

By the time you finish this module, you will be prepared to bring the full power of a user interface to your projects or sales efforts.

Charge!!!



M4 Lesson 1: What is a User Interface?

Lesson Objectives:

- Describe what a user interface is used for

What is the purpose of a user interface?

What are the most common reasons for using a user interface?

Who are the most common users of a user interface?



M5 Lesson 2: Reports

Lesson Objectives:

- Describe what reports are
- Explain what reports are used for

What are the two main types of reports?

Why would you want to use reports?

What are two ways you can run reports?

Why does it help to have a relationship with a DBA?

What does a query allow you to do with your BAS data?



M5 Lesson 3: Graphics

Lesson Objectives:

- Describe what graphics are
- Explain what the common graphics types

What are the four types of graphics?

Should all users have access to all graphics?

What is “graphic flow”?

Why is it important to understand who the user of the graphics will be?



M5 Lesson 4: Schedules

Lesson Objectives:

- Describe the different philosophies on scheduling
- Explain how you would setup scheduling strategies

Why is it important to have multiple schedules?

Should system run hours and occupancy hours be factored into your schedules?

When would it better to have a main schedule and additional specialty schedules versus simply having a schedule for each major system?



MODULE 6: BUILDING AUTOMATION SYSTEM ARCHITECTURE

In this module, we will discuss how a BAS is built. This module's lessons are:

- Lesson 1: What is an Architecture?
- Lesson 2: Four-Tier
- Lesson 3: Three-Tier IP & Non-IP

In my free videos, I often teach the BAS Architecture first, after all, it's the first thing everyone wants to know about. But, you can't appreciate a BAS architecture until you've learned all the foundational knowledge.

Now that you have the basics down from the previous modules we are ready to dive into the architecture.

As we move through this module, pay particular attention to the tiers | layers. Most of the issues I see in sales and installation come from a misunderstanding of the architecture tiers.

Let's squash those issues before they even start.

Let the squashing begin!



M6 Lesson 1: What is an Architecture?

Lesson Objectives:

- Describe what an architecture is

What is an architecture?

What do you use architecture layouts for?

What are the three kinds of BAS architectures?



M6 Lesson 2: Four-Tier

Lesson Objectives:

- Describe what a four-tier architecture is
- Explain what a four-tier architecture would be used for

What are the four parts of the four-tier architecture?

When would you use a four-tier architecture?

What are the benefits of a four-tier architecture?



M6 Lesson 3: Three-Tier IP & Non-IP

Lesson Objectives:

- Describe what a three-tier architecture is
- Explain what a three-tier architecture would be used for

What are the two types of three-tier architectures?

What is the major difference between the three-tier IP and non-IP architectures?

What are the benefits of an IP architecture?

What are the benefits of a non-IP architecture?



MODULE 7: CONTROL SYSTEM TYPES

In this module, we will discuss the control systems that a BAS automates. This module's lessons are:

- Lesson 1: What is a Control System?
- Lesson 2: Pneumatics
- Lesson 3: Analog
- Lesson 4: Electro-Mechanical
- Lesson 5: Direct Digital Control

Now we are starting to get down to the nitty-gritty. You see the main purpose of a BAS is to provide visualization and control of a “control system”.

A BAS, however, is not a control system. This is a fact that is lost on many folks.

The reality is a BAS can sit on top of any “control system,” the problem is that the older and more “analog” (don't worry you'll understand this after lesson 3), a system is the more it will cost to “automate.”

If what I just said didn't make sense, don't worry, it will after this module.

Let the learning begin!



M7 Lesson 1: What is a Control System?

Lesson Objectives:

- Describe what a control system is
- Explain why we use control systems

What is a control system?

What are the main parts of a control system?

Why do we use control systems?



M7 Lesson 2: Pneumatics

Lesson Objectives:

- Describe what a pneumatic system is
- Explain how a BAS ties into a pneumatic system
- Explain how a pneumatic system works

What is a pneumatic system?

What are the main parts of a pneumatic system?

How does a pneumatic system work?

What are the differences between the main line and branch lines?

What are the two main ways a BAS tie into a pneumatic system?



M7 Lesson 3: Analog

Lesson Objectives:

- Describe what an analog system is
- Explain the difference between analog and digital control
- Describe the three types of analog signals

What is an analog system?

What is the difference between a digital and analog system?

What are the three types of analog signals?

Provide an example of an analog system.



M7 Lesson 4: Electro-Mechanical

Lesson Objectives:

- Describe what an electromechanical system is
- Explain how electromechanical systems work

What is an electromechanical system?

How does an electromechanical system work?

What are the common types of electromechanical systems?

How do electromechanical systems tie back to a BAS?



M7 Lesson 5: Direct Digital Control

Lesson Objectives:

- Describe what a Direct Digital Control (DDC) system is
- Explain how a Direct Digital Control (DDC) system work

What is a Direct Digital Control (DDC) system?

Why does a DDC system need to convert analog signals to digital signals?

What are the four common analog input signal types that a DDC system converts to digital?

Why is it important that a DDC system has processing capabilities?

What are some of the benefits of a DDC controller?



MODULE 8: COMMON CONTROL MODES

In this module, we will discuss the most common control modes that you will utilize inside a BAS. This module's lessons are:

- Lesson 1: What is a Control Mode?
- Lesson 2: On | Off
- Lesson 3: Sequenced
- Lesson 4: Floating
- Lesson 5: Pulse Width Modulation (PWM)
- Lesson 6: Proportional
- Lesson 7: Proportional Integral
- Lesson 8: Proportional Integral Derivative

A control system is simply a device that processes an input via a control mode which in turn controls an output.

Simple right? HELL, NO, that was confusing as heck!

But that's how most folks explain control modes. And we wonder, why our industry is lacking knowledgeable folks.

Control modes are simply just a way of controlling a device based on some variable, and as you'll see, pretty much all control modes follow the same pattern of :

Input -> Process -> Output

Let's take a look at what those processes are!



M8 Lesson 1: What is a Control Mode?

Lesson Objectives:

- Describe what a control mode is
- Explain why we use control modes

What is a control mode?

Why do we use control modes?

Why are there different control modes?



M8 Lesson 2: On | Off

Lesson Objectives:

- Describe how on | off control works
- Explain when you would use on | off control

How does on | off control work?

Why do we use on | off control?

What are three examples that you can think of (not in the video) where you would use on | off control?

What are three examples that you can think of (not in the video) where you would NOT use on | off control?



M8 Lesson 3: Sequenced

Lesson Objectives:

- Describe how sequenced control works
- Explain when you would use sequenced control

How does sequenced control work?

Why do you use sequenced control?

What other control mode(s) would you combine with sequenced control?

What are three examples that you can think of where you would use sequenced control?

What are three examples that you can think of where you would NOT use sequenced control?



M8 Lesson 4: Floating

Lesson Objectives:

- Describe how floating control works
- Explain when you would use floating control

How does floating control work?

Why do you use floating control?

What is another name floating control is known by?

Why is it important to know the devices stroke time when using floating control?

What is the main reason for using floating control?



M8 Lesson 5: Pulse Width Modulation (PWM)

Lesson Objectives:

- Describe how PWM control works
- Explain when you would use PWM control

What is PWM control?

What is one of the main uses of PWM control?

Why is PWM control primarily used on inputs?



M8 Lesson 6: Proportional

Lesson Objectives:

- Describe how proportional control works
- Explain when you would use proportional control
- Explain the equation for proportional control

What is proportional control?

How does proportional control work?

What is the equation for proportional control?

How do you calculate your proportional band?

When would you use proportional control?

What is the purpose of the startup or STUP value?



M8 Lesson 7: Proportional Integral

Lesson Objectives:

- Describe how proportional integral (PI) control works
- Explain when you would use PI control
- Explain the equation for PI control

What is PI control?

How does PI control work?

What is the equation for PI control?

How do you calculate your proportional band?

What is the purpose of iLim and iMax?

How do you determine the size of your i value?



M8 Lesson 8: Proportional Integral Derivative

Lesson Objectives:

- Describe how proportional integral derivative (PID) control works
- Explain when you would use PID control
- Explain the equation for PID control

What is PID control?

How does PID control work?

What is the equation for PID control?

Why is PID control used?

Why is the statement most programs do not require PID control true?

What is the purpose of D on PID loops?



MODULE 9: BUILDING AUTOMATION SYSTEM PROTOCOLS

In this module, we will discuss what protocols are and we will take a look at some of the most common protocols. This modules lessons are:

- Lesson 1: What is a Protocol?
- Lesson 2: BACnet, LON, and Modbus

You use protocols every day. When you communicate with people you are using a language which is a set of rules that defines what words mean, how they should be structured, and the flow of conversations.

Well, my friend, protocols do the exact same thing.

And in this module, you are going to learn about the 3 most common protocols in the world of BAS.

Let's get talking!



M9 Lesson 1: What is a Protocol?

Lesson Objectives:

- Describe what a protocol is
- Explain what protocols are used for

What is a protocol?

What are protocols used for?

What are four of the rules that protocols enforce?

What effect does a protocol have on how a device formats its data?

Why is it important to define the correct data type for your inputs?



M9 Lesson 2: BACnet, LON, and Modbus

Lesson Objectives:

- Describe how the three most common protocols work
- Explain the differences between the three main protocols

What are the three main protocols BAS systems use?

How are each of the protocols similar?

What are the IP layer versions of the three protocols called?

What unique device does BACnet/IP need to communicate across subnets?

What is the name of a “point” in Modbus?

How do you define the data type in LON?

At the field bus layer how are devices addressed in the three protocols?



PART 2: CONTROLS IN THE FIELD

Now that you have the foundations established we will be framing the building (sorry, construction pun)... Seriously though, Part 2 is all about providing the context of where you'll use what you learned in Part 1 as well as providing some core supporting knowledge. Part 1 includes the following modules:

- Module 10: The Three Types of Controls Work
- Module 11: Wires, Circuits, Relays, and Safeties
- Module 12: IT Parts and Pieces
- Module 13: Construction Documents
- Module 14: T&B and CxA Overview
- Module 15: The Basics of Integration

As you move through these modules, I want you to focus in on the processes I use, especially in Lessons 10, 13,14, and 15.

The reason I was able to advance so rapidly in my career had a lot to do with the processes I used. You can have all the knowledge in the world, but if you can't apply that knowledge you will be very ineffective.

As I teach in all of my courses, try to find the why (don't worry, I'll help you with that).

Ok, you ready to dive into Part 2?

Let's do this!



MODULE 10: THE THREE TYPES OF CONTROLS WORK

In this module, we will discuss the three types of controls work you could perform throughout your career. This module's lesson is:

- Lesson 1: The Three Types of Controls Work
- Lesson 2: Installation Flow
- Lesson 3: Service and Retrofit
- Lesson 4: Operating and Maintaining

Folks love to classify themselves it helps them feel like they belong. The world of BAS is no different. BAS professionals tend to fall into one of three groups.

And the unfortunate thing is that folks who end up in one group tend to remain in it for their careers. However, there is so much cross learning that you can achieve by being aware of, and consciously studying other “groups”.

That’s why in this module we will discuss what the common “groups” are, what they do, and how you can get involved.

Ready? Let’s go!



M10 Lesson 1: The Three Types of Controls Work

Lesson Objectives:

- Explain the three types of controls work

What are the three types of controls work?



M10 Lesson 2: Installation Flow

Lesson Objectives:

- Describe how the installation project works
- Explain what each step in an installation project

How does an installation project start?

What are the important steps in the sales to operations handoff?

Who is responsible for running a BAS Project?

What is the purpose of an initial submittal?

What is the purpose of lining out your subs?

Should you order material before or after lining out subs?

How is the design submittal different then the initial submittal?

What is the difference between point to point checkout and functional tests?

How do you close out a project?



M10 Lesson 3: Service and Retrofit

Lesson Objectives:

- Describe how the service process works
- Explain what the different types of service
- Explain how to grow your service business

What are the two types of service?

How does the service process work?

What is the purpose of the service dispatcher?

What is the difference between an on-call tech and a lead tech in the service process?

How does the service process loop work?

How does service lead into retrofit projects?

What are three ways you can use the service loop to generate more work?

Why is it important for service techs to understand the service process loop?



M10 Lesson 4: Operating and Maintaining

Lesson Objectives:

- Describe how the operating and maintaining (O&M) process works
- Explain the importance of having performance goals for your O&M processes

What are the three areas of O&M a BAS?

Why should you create performance goals for your O&M

How would you measure your performance goals?

Why is it important to help your customers run their buildings efficiently?



MODULE 11: WIRES, CIRCUITS, RELAYS, AND SAFETIES

In this module, we will discuss the foundational electrical knowledge you'll need to succeed in BAS. This module's lesson is:

- Lesson 1: Intro to Electricity
- Lesson 2: A Deeper Dive into Wiring
- Lesson 3: Relays and Circuits
- Lesson 4: Common Safeties

Ok, so I'm a firm believer of focused effort, and I'm the first to tell prospective BAS professionals that they don't have to be mechanics or electricians to "be good at" BAS.

But on the same note, there is some basic knowledge that is required. In this module, I'm going to be taking you through that basic knowledge.

This is a very important module because a lot of BAS folks mess up circuits and then wonder why things won't work...

Let's get energized!



M11 Lesson 1: Intro to Electricity

Lesson Objectives:

- Describe the fundamentals of electricity
- Explain how Ohm's law relates to BAS

What is Ohm's Law?

What are amperage, voltage and current?

Why is it important to understand the relationships between amperage, voltage and current?

What is the difference between volt-amps and wattage?

How can you use voltage drop on a transformer to determine load?



M11 Lesson 2: A Deeper Dive into Wiring

Lesson Objectives:

- Describe the different characteristics of wiring

What are conductors?

How is wire width measured?

What are the two main types of wiring used with BAS?

What are some of the common uses of each wire type?

Why is it important to understand which conductor is the hot and which conductor is the common?

What is the purpose of a reference wire?

What is the difference between AC and DC?

What is the purpose of a shield?



M11 Lesson 3: Relays and Circuits

Lesson Objectives:

- Describe the different characteristics of wiring

What is a relay?

What are the two parts of a relay?

What are relays used for?

What is the difference between normally open and normally closed contacts?

What are the two main types of relays?

What is a pole?

What is a throw?

What is a circuit?

What is the purpose of a circuit?



M11 Lesson 4: Common Safeties

Lesson Objectives:

- Describe the commonly used safeties

What is the purpose of an air pressure sensing switch?

How does the air pressure sensing switch work?

What is the difference between automatic and manual reset safeties?

Why would you want to use a manual reset?

How do you send alarms from your safeties?

What is the purpose of a low-temp alarm?

What contact do you use for your low-temp status?

What is the purpose of a condensate float switch?

What are the two types of damper end switches?

Why would you use damper end switches?



What is the purpose of flow switches?

When would you use a flow switch?



MODULE 12: IT PARTS AND PIECES

In this module, we will discuss the core information you need to know prior to creating a design. This modules lesson is:

- Lesson 1: This is a Computer
- Lesson 2: Network Basics
- Lesson 3: Remote Connections
- Lesson 4: Virtual Machines

I really want you to focus in on the and inputs and outputs, process, and lifecycle of a design. I know for some of you this is going to seem rather basic.

I get it, I've been there. I know how it feels, you're like "Man I already know this stuff." But, here's the deal, I'm willing to bet you learned this the same way I did, ON THE JOB.

I'm also willing to bet that you've never been "taught" design formally. So, go with me on this, give me a little bit of trust, and I promise you that you will gain at least one tidbit of information from this module.

Let's do this!



M12 Lesson 1: This is a Computer

Lesson Objectives:

- Describe the different resources computers use
- Explain the purpose of each resource

What are the four types of resources for a computer?

Why do you need to understand these resources?

How would you find the resource requirements of BAS software?

What is the advantage of virtual servers when it comes to resources?



M12 Lesson 2: Network Basics

Lesson Objectives:

- Identify the different parts of a BAS network
- Explain what each part of the BAS network is for

What is an IP address?

What is a LAN?

How is a LAN different than a subnet?

What is the difference between a physical LAN and a VLAN?

What is the purpose of a default gateway?

What is a route?

How does a switch know what IP address goes to what device?

What is the name of the physical address of a device that goes into the ARP table?



M12 Lesson 3: Remote Connections

Lesson Objectives:

- Explain what remote access is
- Understand the process of remote access

What is the purpose of remote access?

What are the three types of remote access?

What are the differences between the three types of remote access?

Why is having a public IP address a bad case in most scenarios?



M12 Lesson 4: Virtual Machines

Lesson Objectives:

- Describe what a virtual machine is
- Explain the benefits of virtual machines

What is a virtual machine?

What does allocating resources to a virtual machine mean?

What is a snapshot?

How does a snapshot work?

What does the term elasticity mean?

What are a few of the benefits of virtual machines?



MODULE 13: Construction Documents

In this module, we will discuss the construction documents you will use during your BAS career. This module's lesson is:

- Lesson 1: Reading Plans
- Lesson 2: Reading Specs
- Lesson 3: BAS Design Documents

Now some of you may already be familiar with construction documents and if you are great!

I still encourage you to go through these videos as I share several tidbits that will help you avoid gotchas as well as to understand what to expect when you are reviewing construction documents.

So let's take a look



M13 Lesson 1: Reading Plans

Lesson Objectives:

- Describe what “plans” are
- Identify the different parts of plans
- Explain how to look at plans as a controls professional

What does the acronym MEP mean?

What are the main types of mechanical plans?

How do you avoid feeling overwhelmed by plans?

What is a floorplan?

What are notes?

What are details?

What is an equipment schedule?

Why is it important to clarify the sequence if it exists both in the drawings and spec?



M13 Lesson 2: Reading Specs

Lesson Objectives:

- Describe the parts of a specification
- Explain how to look at specification

What should you always assume before looking at a specification?

What are four main parts of a specification?

What is the importance of understanding related sections?

Where in the specification will you usually find the submittal requirements?

What is the purpose of the products section of the specification?

How do parts of the specification interrelate?



M13 Lesson 3: BAS Design Documents

Lesson Objectives:

- Identify the different BAS design documents
- Explain the purpose of each BAS design document

What are the different types of BAS control documents?

What is the purpose behind each control document?

How does each document relate to other documents?



MODULE 14: T&B AND CxA OVERVIEW

In this module, we will discuss the process of test and balance and commissioning. This module's lesson is:

- Lesson 1: A Deeper Dive into the Project Process
- Lesson 2: What is Test and Balance?
- Lesson 3: What is Commissioning?

There are two main parts of the construction process that tend to get messed up. The first is design submittals, and we covered that in the previous module.

The next part is the test and balance and commissioning process. I've met several experienced folks who still do not have a good grasp on how to manage these processes. That's what we will focus on in the next three modules.

Let's check it out...



M14 Lesson 1: A Deeper Dive into the Project Process

Lesson Objectives:

- Understand how to manage the project process

Why do you want to identify who will perform point-to-point (P2P) checkout?

What is the benefit of having your subs perform P2P checkout?

Why is it important to agree on the as-built process?

What is the purpose of creating a test and balance graphic?

What is the purpose of training test and balance on your system?

What are the three types of functional tests?

What is the purpose of a commissioning agent?

When would it make sense not to do a functional test?



M14 Lesson 2: What is Test and Balance?

Lesson Objectives:

- Describe how test and balance (T&B) works
- Explain the involvement of the BAS professional in T&B

What is the purpose of T&B?

How does T&B work?

What is the involvement of the BAS professional in the T&B process?

Why is it important to not expose your calibration factors?



M14 Lesson 3: What is Commissioning?

Lesson Objectives:

- Describe how commissioning (Cx) works
- Explain what the BAS professional's role in Cx is

When are functional test created?

Why is it important to create your as-builts after your functional tests?

What is a functional test sheet?

What are the different ways of performing functional testing?

When would you use the RFI/RFC process in a functional test?



MODULE 15: THE BASICS OF INTEGRATION

In this module, we will discuss the fundamentals of integration. This module's lesson is:

- Lesson 1: What is Integration?
- Lesson 2: What is Test and Balance?

Systems integration is a difficult topic for many folks. The problem usually is that the folks performing systems integration get intimidated by the idea of tying two systems together and talk themselves out of integration before it even happens.

In this module, I'm going to explain what systems integration really is and why you don't need to be afraid of it.

Let's tie some stuff together!



M15 Lesson 1: What is Integration?

Lesson Objectives:

- Explain the three forms of integration

What are the forms of integration?

Provide an example of each of the three forms of integration.



M15 Lesson 2: A Look at A Simple Integration Example

Lesson Objectives:

- Understand how integration is performed

How does the network layout effect integration in the example I am going through?

What form of integration and I'm performing in this video?

Why is it important to define who is the lead system when performing integration?



NEXT STEPS

Congratulations on making it this far. You've started down the journey of learning BAS and you have a solid foundation that you can build upon.

It's at this point that most of my students ask what's next?

You just moved through the Platinum version of this course.

At this point you have a solid foundation to continue to grow your BAS Knowledge.

There are two skills that are very important for all BAS professionals to understand and those are:

- How to design a BAS
- Information Technology

I encourage you to checkout each of these programs at my course page which you can access by [clicking right here](#).

To your success,

-Phil