



Course Workbook

1st Edition



DESIGN FOR BAS PROFESSIONALS

LEARN THE EXACT STEPS FOR DESIGNING A BAS PROJECT.

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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 two 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.

Don't skimp on these two 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 two steps above you will see massive results as you work through this course.

I look forward to hearing about your success story.

To your success,

-Phil



DESIGN FOR BAS PROFESSIONALS

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CORE: THE FOUNDATIONS

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

- Lesson 1: What is a BAS Design
- Lesson 2: The Inputs to a BAS Design
- Lesson 3: The Life-Cycle of a Design
- Lesson 4: The Outputs of a BAS Design

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!



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LEARN THE EXACT STEPS FOR DESIGNING A BAS PROJECT.

Core Lesson 1: What is a BAS Design

Templates

- None

Lesson Objectives:

- Describe what a BAS design is and what it is used for

What are the key three elements for a design? (Provide an example of each element)

Why is it critical that you have each of the three elements in your BAS design?

Can you think of a time when you created or used a design that was missing one of these elements? (How did this missing element effect the project)

Key Point: Most installation failures can be tied back to one of these design elements not being present.



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Core Lesson 2: The Inputs to a BAS Design

Templates

- None

Lesson Objectives:

- Identify the different inputs to a BAS design
- Explain what each input is used for

What are the six types of inputs to a design?

Will you have every input type on all projects?

When would you expect to find each input?

What will each input consist of? (Example a scope of work may contain a material list, assumptions, and exclusions)

Key Point: You must have the right inputs to create a design. If your inputs are incomplete, it is your job as a designer to find the right person(s) to get the information you need. You should never say, “Well I just designed it based on what I was given”



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Core Lesson 3: The Life-Cycle of a Design

Templates

- None

Lesson Objectives:

- Explain the BAS Design life-cycle

What is a life-cycle?

How many phases are in the BAS Design life-cycle?

Describe each phase of the BAS Design life-cycle?

What are the three triggers for a BAS Design?

What actions should take place in each phase of the BAS Design life-cycle?

Can you be in multiple phases of the BAS Design life-cycle at the same time?
What would this look like?

Key Point: It is critical that you understand the BAS Design life-cycle. The life-cycle is like a map; without a map you will not know where you are at. In my experience designs fail because there is no clear process when the design is being created. Use the process, live the process, be one with the process :-D



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Core Lesson 4: The Outputs of a BAS Design

Templates

- None

Lesson Objectives:

- Identify the different outputs for a BAS design
- Explain what each output is used for

What are the 7 most common outputs from the BAS Design process?

What should each output include?

Key Point: Right or wrong, the outputs you create will be the measure of your success as a designer. Make sure you keep your outputs as simple as possible, while providing the information the installer, programmer, and operator need.



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LEARN THE EXACT STEPS FOR DESIGNING A BAS PROJECT.

PHASE 1: INITIATING THE DESIGN

In this module we will go through the first phase of the BAS Design life-cycle. This is a short module but it is an absolutely critical module. The lessons in the module are:

- Lesson 1: Scoping the Project
- Lesson 2: The Sales to Operations Handoff

The job of a designer is to create a simple, easy to understand design, that meets the owner and engineer's intent. However, in order to do this, you need to have the correct information.

Early on in my career I didn't understand the importance of a proper BAS Design initiation. Consequently, I made several mistakes in my early designs.

The level of detail you put into this phase will have a direct impact on the amount of resubmittals and the amount of rework you have to do.

Pay particular attention to the processes and utilize the templates I provided you they will assist you in making this phase a success.



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LEARN THE EXACT STEPS FOR DESIGNING A BAS PROJECT.

Phase 1 Lesson 1: Scoping the Project

Templates

- None

Lesson Objectives:

- Understand the components of a BAS scope
- Explain how each component is used in the design

What are the key components of a BAS scope?

What is the difference between assumptions and exclusions?

Why is it important that you are using an accepted and signed scope for your designs?

Can you still be responsible for exclusions that are not accepted?

Key Point: You must be working off of a signed and accepted scope of work. Otherwise your design is liable to changes that were not agreed upon.



Phase 1 Lesson 2: The Sales to Operations Handoff Templates

- Sales to Operations Handoff Template

Lesson Objectives:

- Understand what the sales to operations handoff is
- Explain each step of the sales to operations handoff
- Conduct a sales to operations handoff

What is the purpose of a sales to operations handoff?

Who should be at the sales to operations handoff?

What documents does the sales team need to provide during the handoff process?

Key Point: The sales to operations handoff should be done on all projects. Yes, I know it's a pain to do it on that small \$10,000 project. But ask yourself, is it really? If you are following a process, then it shouldn't be a pain. Be non-negotiable on this process. If you start deviating from the process, then it makes it acceptable for others to deviate as well.



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PHASE 2: CREATING THE DESIGN

In this module we will go through the second phase of the BAS Design life-cycle. In this module we will be creating a full-blown BAS Design from scratch. The lessons in the module are:

- Lesson 1: The Design Process
- Lesson 2: Reviewing the Inputs
- Lesson 3: The RFI | RFC Process
- Lesson 4: Creating the Controls Network Riser
- Lesson 5: Creating the System Drawings
- Lesson 6: Creating the Controller Drawing
- Lesson 7: Creating the Electrical Details
- Lesson 8: Creating the Bill of Materials

This module is going to teach you the fundamentals behind creating design outputs for a BAS project. Each manufacturer will have a different format and style for these outputs but the principles behind creating the outputs will remain the same.

The important thing to take from each of these lessons is the why, what, and how behind each outputs creation. Once you understand why we create the output, what we create for the output, and how we create the output you can easily adjust for your particular manufacturers preferences.



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LEARN THE EXACT STEPS FOR DESIGNING A BAS PROJECT.

Phase 2 Lesson 1: The Design Process

Templates

- None

Lesson Objectives:

- Explain how the design process works

What are the four steps in the design process?

Describe each of the four steps and an action you would take during each step.

Key Point: By following the design process you will be able to instantly know where you are in any BAS design. This will allow you to have multiple designers working on a project at the same time.



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LEARN THE EXACT STEPS FOR DESIGNING A BAS PROJECT.

Phase 2 Lesson 2: Reviewing the Inputs

Templates

- Scope Summary Template

Lesson Objectives:

- How to review design inputs and utilize them for your design

What are the three design inputs you want to review?

Name three things you are looking for in each design input.

How can you tell if you have the most current design input?

Key Point: You should always be using the latest construction documents. That is why it is important to create a habit of reviewing documents prior to designing.



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Phase 2 Lesson 3: The RFI | RFC Process

Templates

- RFI | RFC Template
- RFI | RFC Log Template

Lesson Objectives:

- Explain the RFI | RFC Process
- Manage an RFI | RFC Log
- Submit RFI | RFC Requests

What is the difference between an RFI and RFC?

What is the RFI | RFC process?

What is the purpose of the RFI | RFC log?

How do you fill out the RFI | RFC template?

Key Point: The RFI | RFC process is a tool you should readily use to gather information you need for your design. However, be sure to attend job meetings and ask questions so that when you really need to submit an RFI | RFC, folks will not be tired of you.



Phase 2 Lesson 4: Creating the Controls Network Riser

Templates

- Bill of Material Template

Lesson Objectives:

- Explain the what a network riser is
- Interpret construction documents for your network riser layout
- Create a network riser

What are the four key parts of a network riser?

Why must you understand the system layout before creating a network riser?

When creating a network riser how to you indicate integrated systems?

What is a field trunk?

Key Point: It is very important that you think about how and why you are laying out your network riser prior to creating it.



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Phase 2 Lesson 5: Creating the System Drawings

Templates

- Point List Template

Lesson Objectives:

- Explain the what a system drawing is
- Interpret construction documents for your system drawing layouts
- Create a system drawing

What is a system drawing?

What is a stencil?

How do you create a system drawing?

What are the four items that must be included on a system drawing?

Why is it important to have your naming standard created before creating your system drawing?

Key Point: System drawings are the main thing design engineers look at when they review your submittals. A single mistake here can cause an instant submittal rejection.



Phase 2 Lesson 6: Creating the Controller Drawing Templates

- None

Lesson Objectives:

- Explain the what a controller diagram is
- Interpret construction documents for your controller diagram layouts
- Create a controller diagram

What are the three key parts of a controller diagram?

Why is it important to have your system drawing created before creating your controller diagrams?

Why should you have a bill of materials on your controller diagram?

Key Point: Controller drawings are invaluable for installers, technicians, and owners. This is the single most valuable drawing after the building is built.



Phase 2 Lesson 7: Creating the Electrical Details

Templates

- None

Lesson Objectives:

- Explain the what electrical details are
- Create electrical details

What is the purpose of an electrical detail?

How do you create an electrical detail?

Why is it important to work with your installer/electrician when you create an electrical detail?

Why would you use electrical details instead of laying out your wiring on a controller diagram?

Key Point: The idea behind electrical details is to provide guidance to your installers so that your controls get installed the way you want them to be. Do not hesitate to collaborate with your installer when you are creating your electrical details.



Phase 2 Lesson 8: Creating the Bill of Materials

Templates

- Bill of Material Template

Lesson Objectives:

- Explain the what a Bill of Materials is
- Create a Bill of Materials

What is the purpose of a Bill of Material?

Why would you want to have a master BoM?

How can you avoid having to much or too little product being ordered?

Key Point: The bill of material should exist in two places. You should have a bill of material on your drawings. But you should also have a master BoM that has all of the materials you will be providing. This will help avoid slippage and material overruns.

PHASE 3: MODIFYING THE DESIGN

In this module we will go through the third phase of the BAS Design life-cycle. This phase is all about submitting your design, responding to clarifications and rejections, and finalizing your design submittal. The lessons in the module are:

- Lesson 1: The Submittal Process
- Lesson 2: Packing Up Your Submittal
- Lesson 3: Processing Feedback
- Lesson 4: Final Submittal

The objective of the modifying phase is to get your submittals approved in the shortest time possible, **WITHOUT** sacrificing quality. Sure you can copy and paste the layouts and sequences from the mechanical plans and call it a day (I'll admit; I've done this in the past). But that does not make your submittals good.

The goal here is to create submittals that your field team (installers and programmers) and operator can use. In this phase, we discuss how to balance the need for quality and the need for speed.



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LEARN THE EXACT STEPS FOR DESIGNING A BAS PROJECT.

Phase 3 Lesson 1: The Submittal Process

Templates

- None

Lesson Objectives:

- Understand the submittal process
- Describe how to identify submittal requirements

Describe the five steps of the submittal process.

What are the three types of submittals you will most likely produce?

When do you produce each of the submittal types you listed above?

What should be contained in each of the three submittal types?

Key Point: Understanding the type of submittal required will dramatically improve your efficiency. I've seen many designers creating full-blown submittals when a basic material submittal was all that was required.



Phase 3 Lesson 2: Packing Up Your Submittal Templates

- Submittal Requirement Template

Lesson Objectives:

- How to review the specification for submittal requirements
- How to populate the submittal requirement worksheet
- How to create, organize, and compress a submittal package

What is the process for packaging up your submittal?

Why is it critical that you understand the specifications submittal requirements?

How do you document the submittal requirements?

What are some methods for organizing your submittal package?

Key Point: You absolutely must follow the requirements lined out within the specification for your submittals.



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Phase 3 Lesson 3: Processing Feedback

Templates

- Submittal Rejection log

Lesson Objectives:

- Describe why a submittal can be rejected
- Process submittal rejections and feedback
- Utilizing the submittal rejection log

What are the three main reasons a submittal can be rejected?

How can you resolve each reason described above?

How do you keep a list of each submittal rejection?

What is a strategy you can use if your submittals keep getting rejected?

Key Point: It is important to understand the reason behind the rejection. Do not try to just “fix it” unless you understand why your submittal was rejected.



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Phase 3 Lesson 4: Final Submittal

Templates

- None

Lesson Objectives:

- Understand the resubmittal process
- Describe three strategies for increasing the likelihood of final submittal acceptance

What is the resubmittal process?

What are the three strategies to increase your chances of a successful resubmit.

Describe how you would use each strategy.

Key Point: The most important factor of whether a submittal gets approved is whether it meets the intent of the engineer and/or owner. If you are unclear on that intent, it is your duty to find out what the intent is.



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PHASE 4: CLOSING OUT THE DESIGN

In this module we will go through the fourth and final phase of the BAS Design life-cycle. In phase four we are focused on closing out the design. The lessons in the module are:

- Lesson 1: The Closeout Process Core
- Lesson 2: The Lesson 2: Creating Point-to-Point Checkout Documents
- Lesson 3: Functional Test Sheets
- Lesson 4: Creating and Consolidating Redlines
- Lesson 5: The As-Built Process
- Lesson 6: Creating As-Builts

The purpose of phase four is to create the kind of as-builts that you would want if you were an owner. This phase includes processes that may or may not be used on every project.

For example, on some projects you may perform functional tests to validate equipment operation. On other projects you may not perform this process. However, it is important for you to understand the process and where it lies in the closeout phase.



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Phase 4 Lesson 1: The Closeout Process

Templates

- None

Lesson Objectives:

- Understand the closeout process
- Describe what is created during the closeout process

What is the close out process?

What are the two types of closeouts?

What documents are created during the closeout process?

Key Point: It is important to determine what activities need to happen before the project reaches its end that way you can create the appropriate project closeout documents ahead of time.



Phase 4 Lesson 2: Creating Point-to-Point Checkout Documents

Templates

- Point List Template

Lesson Objectives:

- Describe what point-to-point checkout documents are
- Create a point-to-point checkout document

What is a point-to-point checkout document?

How do you use a point-to-point checkout document?

What is the difference between a point-to-point sample vs full check?

When should you use a full check vs a sample?

Key Point: It is important to establish a point standard early in the project so that you can create a points list that will double as your point-to-point checkout document. This will save you and your installers time.



Phase 4 Lesson 3: Functional Test Sheets

Templates

- Functional Test Plan Template

Lesson Objectives:

- What are functional test sheets
- How to create functional test sheets

What are functional test sheets?

When would you use functional test sheets?

What are the five steps for creating functional test sheets?

Key Point: Creating functional test sheets early in the project will help you to engage the commissioning agent and will enable your installers to be able to check system functionality sooner, which will get your team off the job quicker.



Phase 4 Lesson 4: Creating and Consolidating Redlines

Templates

- None

Lesson Objectives:

- Describe what a redline is
- Explain redline best practices to your installers and technicians

What are redlines?

Why do you need to have a process for creating and managing redlines?

What are my three simple steps for managing redlines?

Key Point: It is important to agree with your installer and technicians how redlines will be handled early in the project.



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Phase 4 Lesson 5: The As-Built Process

Templates

- None

Lesson Objectives:

- Understand the as-built process
- Describe how to create as-builts
- Describe how to use as-builts in close out documents

What are the five steps of the as-built process?

Describe how each step works and what should be done in each step.

How do you know what format to use when you categorize your as-builts?

Key Point: In most cases the specification will tell you how to categorize your as-builts. If the specification does not define this, then you will want to submit an RFI to clarify this.



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Phase 4 Lesson 6: Creating As-Builts

Templates

- None

Lesson Objectives:

- Create as-builts

What are the three things you want to remember prior to creating your as-builts?

Key Point: Remember, you want to leave the owner with the same kind of as-builts you'd like to have. This is your time to shine and to set yourself apart by delivering a great set of as-builts.



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LEARN THE EXACT STEPS FOR DESIGNING A BAS PROJECT.

NOTES:

Use this section to write down any notes you learn as you move through the course.



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