This publication consists of three sections: facilitator's guide--train the trainer, facilitator's guide sample--Basic Blueprint Reading (Chapter 1), and participant's guide sample--Basic Blueprint Reading (Chapter 1). Section I addresses why the trainer should learn new classroom techniques; lecturing versus facilitating; learning styles inventory; suggestions for tactile, visual, and auditory learners; ideas for interactive training; and arranging the room. Section II contains the curriculum for Chapter 1 on Basic Blueprint Reading. Introductory facilitator materials include a one-page summary of course basics, objective, and course overview with blueprint reading content and learning strategies; and checklist of materials needed. Information and exercises are provided on learning strategies, study strategies, reading strategies, key terms, note taking, job aids, memory aids, organization, and classroom strategies. Symbols that represent the various terms and ideas are presented in a side column and used in the curriculum to alert the trainer and/or student that certain activities or responses are recommended. Throughout the sample curriculum, facilitator pages provide tips for the facilitator. The guide provides objectives, learning materials, activities, chapter review, answer keys, Checkpoint 1, and participant score sheet. Section III contains a complete set of learner's materials suitable for duplication. (YLB)
Train the Trainer
Facilitator Guide Sample
Basic Blueprint Reading (Chapter One)
Contents

Facilitator's Guide — Train the Trainer

Introduction .................................................................................................................. F - 1
Why Should You Learn New Techniques for the Classroom? ......................... F - 1
Lecturing vs. Facilitating ......................................................................................... F - 2
Getting Results .......................................................................................................... F - 3
Assuring Learner Success ....................................................................................... F - 4
Learning Styles Inventory ....................................................................................... F - 5
Suggestions for Tactile Learners ........................................................................... F - 6
Suggestions for Visual Learners ............................................................................ F - 7
Suggestions for Auditory Learners ....................................................................... F - 8
Facilitation Activity ................................................................................................... F - 9
Ideas for Interactive Training ................................................................................ F - 10
Arranging the Room ................................................................................................ F - 11

Facilitator's Guide Sample — Basic Blueprint Reading (Chapter 1)

Course Basics and Objective .................................................................................. F - 12
Course Overview ...................................................................................................... F - 12
Materials Needed ..................................................................................................... F - 13
Learning Strategies ................................................................................................ LS - 1
Study Strategies ...................................................................................................... LS - 1
Reading Strategies ................................................................................................ LS - 7
Classroom Strategies .............................................................................................. F - 14
Introductory Activity .............................................................................................. F - 19
Introductory Activity .............................................................................................. A - 1
Preview ..................................................................................................................... F - 20
The Title Block and Alphanumerics ...................................................................... 1
Objectives ................................................................................................................ 1
Key Words ................................................................................................................ F - 21
The Title Block ....................................................................................................... 2
Participant's Guide Sample —
Basic Blueprint Reading (Chapter 1)

Introductory Activity .................................................. A-1
The Title Block and Alphamericics ................................. 1
Objectives ................................................................. 1
The Title Block ............................................................ 2
Alphanumeric Systems .................................................. 8
Abbreviations ............................................................. 9
Memory Tricks ............................................................. 11
Part Number/Drawing Number ...................................... 12
Basic Blueprint Reading Chapter 1 Review .................... 15
Chapter 1 Answers ....................................................... 18
Checkpoint and Response Sheets ................................. F - 26
Checkpoint 1 — The Title Block and Alphanumeric System... 20
Checkpoint 1 Answers .................................................. F - 27
Participant Score Sheet ............................................... 22
Participant Feedback ................................................... 23
How Are You Doing? .................................................... F - 29
Follow-up Checklist ................................................... F - 30
Facilitator's Guide — Train the Trainer
Introduction

*Why Should You Learn New Techniques for the Classroom?*

Ask yourself the following questions and check one appropriate box for each.

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Would you like to improve the results of your classes?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Do you believe all learners can succeed?</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>Are you looking for more interactive training methods?</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>

- If you answered *yes* to any of these questions, then this manual is for you.
Lecturing vs. Facilitating

Which do you believe is more effective: lecturing or facilitating?

Based on adult learning theory, effective facilitation with adult learners relies on some important facts:

- Facilitators should ask questions throughout training.
- Facilitators should use a variety of presentation methods allowing all learners to use their learning strengths (visual, auditory, and tactile).
- Adult learners must understand how the training ties into their lives.
- Adults learners must have the opportunity to use what they are learning.

And remember: Of all teaching strategies, lecturing produces the lowest retention rate.

This curriculum is designed to maximize participant retention through an interactive approach to learning. The facilitator guide pages, printed on colored paper, provide tips for the facilitator.
Getting Results

Do you:

- Prepare the overheads, flip charts, and class agenda prior to class?
- Organize?
- Make smooth transitions between topics?
- Move around the classroom?
- Involve the participants through questions?
- Keep lecture to a minimum?
- Pause to allow thinking time?
- Try to be creative with your class materials?
- Use visual aids often?
- Speak clearly and use appropriate vocabulary?
- Provide learning opportunities for all learning styles?

The information on the following pages will help you approach your classes with confidence and with a better understanding of adult learners.
Assuring Learner Success

Have you ever been frustrated when learning a new skill? If so, perhaps your learning style was not addressed. Do you know which of these three primary styles best describes the way you learn?

- Tactile
- Visual
- Auditory

- Identify your learning style by taking the inventory on the following page.
- Consider giving the inventory to your participants at the beginning of your course.
### Learning Styles Inventory

Your *learning style* is your preferred way to process, recall, and remember information. Place a check next to the activities below that best describe you.

<table>
<thead>
<tr>
<th>I like to/I:</th>
<th>I:</th>
<th>I:</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ fold paper when told to make columns.</td>
<td>☐ love to talk.</td>
<td>☐ ignore spoken directions.</td>
</tr>
<tr>
<td>☐ rock in a chair.</td>
<td>☐ love to listen to someone read or talk.</td>
<td>☐ ask for repeated directions.</td>
</tr>
<tr>
<td>☐ shake my leg.</td>
<td>☐ talk to myself.</td>
<td>☐ look to see what others are doing.</td>
</tr>
<tr>
<td>☐ tap or wiggle pens, pencils, etc.</td>
<td>☐ read aloud.</td>
<td>☐ get the words to a song wrong.</td>
</tr>
<tr>
<td>☐ reach out to touch everything.</td>
<td>☐ am distracted by noises.</td>
<td>☐ turn the radio or TV up very loud.</td>
</tr>
<tr>
<td>☐ do not trust my eyes or ears until I touch something.</td>
<td>☐ use my finger to read.</td>
<td>☐ write lots of notes.</td>
</tr>
<tr>
<td>☐ collect &quot;things.&quot;</td>
<td>☐ put my head near my work.</td>
<td>☐ watch the speaker's mouth.</td>
</tr>
<tr>
<td>☐ have a low interest in reading.</td>
<td>☐ hood my eyes with my hand.</td>
<td>☐ don't like to talk on the phone.</td>
</tr>
<tr>
<td>☐ break up toothpicks or play with straws.</td>
<td>☐ don't do well with charts &amp; graphs.</td>
<td>☐ go off into another world when lectured to.</td>
</tr>
<tr>
<td>☐ take things apart, put things together.</td>
<td>☐ need words to go with a cartoon.</td>
<td>☐ enjoy reading.</td>
</tr>
<tr>
<td>☐ dress for comfort.</td>
<td>☐ can't draw without something to copy.</td>
<td>☐ do well with charts and graphs.</td>
</tr>
<tr>
<td>☐ take lots of baths or showers.</td>
<td>☐ can't use maps; need oral directions.</td>
<td>☐ need maps; get lost with oral directions.</td>
</tr>
<tr>
<td>☐ talk fast, using my hands.</td>
<td>☐ use jingles to learn things.</td>
<td>☐ have good handwriting.</td>
</tr>
<tr>
<td>☐ tend to interrupt.</td>
<td>☐ don't do well with symbols.</td>
<td>☐ am good at puzzles.</td>
</tr>
<tr>
<td>☐ like to try new things.</td>
<td>☐ can't stand silences; need to talk and need others to talk.</td>
<td>☐ am organized; like things neat.</td>
</tr>
</tbody>
</table>

| Total = ___________ (Tactile) | Total = ___________ (Auditory) | Total = ___________ (Visual) |

Count the check marks in each column and place the total at the bottom. The column with the most checks indicates your *primary learning style*.

My primary learning style is ____________________________
Suggestions for Tactile Learners

Highlight the tips that you can apply to your work.

- Demonstrate something instead of simply talking about it.
- Allow students to move around and/or interact with concepts.
- Use props to illustrate ideas.
- Include opportunities for learners to write and speak during class through partnered and small-group activities.
- Use logs or journals for reflective feedback.
- Give tactile learners an opportunity to teach whenever possible.

Add other tips that work for you:

- 
- 
- 

Tactile

\[ 	ext{Hands demonstrating a concept] \]
Suggestions for Visual Learners

Highlight the tips that you can apply to your work.

- Show visuals when discussing information, e.g., overheads, drawings, pictures, props, etc.
- Use and ask learners to create visual material, e.g., art, graphs, and games for problem solving.
- Assign reading prior to presenting information in class.
- Use logs or journals for reflective feedback.
- Videotape learners and ask for learner assessment.

Add other tips that work for you:

- 
- 
- 

Suggestions for Auditory Learners

Highlight the tips that you can apply to your work.

- Allow students to record your class, or record yourself and allow learners to check out recordings.
- Use activities that encourage conversation, e.g., brainstorming, interviews, study groups, games, etc.
- Ask open-ended questions to stimulate discussion when using visual information.
- Use individual conferences to touch base with students.

Add other tips that work for you:

•
•
•
Facilitation Activity

Read the paragraph below and answer the following questions to practice identifying learning styles.

Steve is a renegade you have in one of your classes. Your first encounter with Steve occurred when he asked you, in the middle of class, if you were married and persisted in asking personal questions. Steve also has numerous ideas for how you should teach the class. Steve’s limited attention span is obvious in his intense pencil tapping, his obsession with his baseball hat, and his frequent and inappropriate talking.

1. What is Steve’s learning style?

2. What clues helped you identify his style?

3. What techniques would you use with Steve?
Ideas for Interactive Training

Interactive training can address all learning styles. Which of the following techniques will increase participants’ understanding of the content material?

- Partnered or small-group problem-solving activities
- Colorful visuals
- Use of questions throughout presentations
- Use of highlighters with written materials
- Discussions and brainstorming
- Debates
- Participant-generated questions that stimulate discussions
- Allowing participants to teach sessions

What interactive training ideas would work with your learners?

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
Arranging the Room

Room arrangement has a tremendous impact on learning. Try to arrange your training room like one of the following examples.

Example 1

Example 2
Facilitator's Guide Sample

Train the Trainer
Course Basics and Objective

Time = 24 Hours [1 Hour Classes, 2 Times per Week (Optimal)]

The objective of this course is twofold: the understanding of Blueprint Reading combined with learning strategies.

Course Overview

The Blueprint Reading content and the learning strategies work together.

<table>
<thead>
<tr>
<th>Blueprint Reading Content</th>
<th>Learning Strategies*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chapter 1—Title Block and Alphanumerics</td>
<td>Reading Strategies</td>
</tr>
<tr>
<td>Components of Title Block</td>
<td>Questioning</td>
</tr>
<tr>
<td>Numbering System for Parts and Prints</td>
<td>Skimming</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 2—Departmental Documentation</th>
<th>Study Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Forms That Compliment Blueprints: Parts Lists, Work Orders, Schedules, Modifications</td>
<td>Key Terms</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 3—Math and Measurement</th>
<th>Job Aids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Decimals</td>
<td>Memory Skills</td>
</tr>
<tr>
<td>Tolerances</td>
<td>Organization Skills</td>
</tr>
<tr>
<td>Fractions</td>
<td></td>
</tr>
<tr>
<td>Geometric Formulas</td>
<td></td>
</tr>
<tr>
<td>Measurement &amp; Tools</td>
<td></td>
</tr>
<tr>
<td>Machinist Terminology</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Chapter 4—Visuals</th>
<th>Classroom Strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Types</td>
<td>Group Activities</td>
</tr>
<tr>
<td>Views</td>
<td>Feedback</td>
</tr>
</tbody>
</table>

*learning strategies are integrated with Blueprint Reading content material throughout the course
### Materials Needed

#### Checklists

<table>
<thead>
<tr>
<th>Facilitator’s Materials</th>
<th>Participant’s Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>☐ Facilitator’s Guide— Includes Overheads</td>
<td>☐ 1 Learner’s Guide*</td>
</tr>
<tr>
<td>☐ Overhead Projector and Screen</td>
<td>☐ Highlighter(s)*</td>
</tr>
<tr>
<td>☐ Set of Blank Overhead Film</td>
<td>☐ 2–3 Pencils*</td>
</tr>
<tr>
<td>☐ Set of Overhead Markers</td>
<td>☐ 1 Name Tent/Tag*</td>
</tr>
<tr>
<td>☐ Blackboard or Marker Board</td>
<td>☐ 1 Calculator*</td>
</tr>
<tr>
<td>☐ Flip Chart</td>
<td>☐ 1 Machinist Scale*</td>
</tr>
<tr>
<td>☐ Machinist Scale</td>
<td>☐ Plenty of Scrap Paper</td>
</tr>
<tr>
<td>☐ 10–15 Copies of Blueprints</td>
<td>*items/participant</td>
</tr>
<tr>
<td>☐ Calculator</td>
<td></td>
</tr>
<tr>
<td>☐ Objects From the Company to Measure in Chapter 3</td>
<td></td>
</tr>
<tr>
<td>☐ 6–8 Meter Sticks</td>
<td></td>
</tr>
<tr>
<td>☐ Three-Dimensional Geometric Shapes</td>
<td></td>
</tr>
</tbody>
</table>
Learning Strategies

Study Strategies

1. Key Term
   Look for new words, abbreviations, main ideas, definitions, and formulas.

2. Note Taking
   Identify your study strengths and develop a system that works for you (i.e., use highlighters, abbreviations, shorthand, outlines, etc.).

3. Job Aid
   Create and use visual tools to help you on the job.

4. Memory Aid
   Use tips, formulas, and memory tricks.

5. Organization
   Manage your documents, duties, ideas, and time.
Key Term

A key term is a new idea, definition, or formula that you need to remember. This is the *key term* symbol used throughout the course. When you see it, note all of the key terms on the page.

When learning a new skill, you sometimes need to learn a new “language.” Key terms are the basics of a language. They are often underlined, bold, or italicized and can frequently be found in a book’s glossary.

What can you do to help yourself remember key terms?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

In Chapter 1, what are four key terms?

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

________________________________________________________________________
________________________________________________________________________
Note Taking

Note taking is identifying a system that helps you remember information. This is the note taking symbol used throughout the text. When you see it, use these tips to get the most out of taking notes:

Draw pictures. Repeat information out loud. Ask the speaker to repeat information. Tape record the information to take notes at a later time. Highlight written material to skim faster. Abbreviate for margin notes and outline notes. Develop your own shorthand. Abbreviate w/o losing meaning.

| & ...... and | 2 ....... to |
| @ ...... at | ^ ....... up |
| $....... cash, cost, or money | wh/ .... which |
| ea ...... each | w/ ...... with |
| ex ...... example | w/o ...... without |
| / .......... no | u ......... you |
| # .......... number |

- Listening = Tune in 2 the speaker’s motions, vocal tone, & rhythm 2 know what’s important.
  Tip! Bored? Ask a question or make a comment!

- Analyzing = Think of the speaker’s outline. Practice thinking like the speaker.
  Tip! Answer the questions who?, what?, where?, when?, why?, & how?

- Selecting = Highlight w/ colors 2 pull headlines & important facts off the page.
  Tip! Find & highlight the 5 Ws & How.

- Writing = Divide paper in 2 lengthwise; write notes on the left & headlines on the right.
  Tip! Make small drawings in the margins 2 lift key ideas off the page. Write legibly.

Highlight the information on this page that you want to remember.
Job Aid

A job aid can be a drawing, chart, memory device, or instructions — almost anything that makes a task easier to remember. This is the *job aid* symbol used in the course. When you see it, use the included job aid used in class or create one of your own.

- A job aid can be created by anyone. Have you ever created a to-do list, a chart for household chores, or a flashcard for learning new ideas? These are all job aids.

What other job aids have you created? _______________________

_________________________________

Do you have any ideas for a work-related job aid? ______________

_________________________________

_________________________________

_________________________________
Memory Aid

A memory aid is a device that helps you remember information. This is the memory aid symbol used throughout the course. When you see it, practice the given memory aid or create one of your own.

A memory aid can be created by anyone and can be used for almost anything. For example, one way to remember the five Great Lakes is the word “HOMES.”

Huron Ontario Michigan Erie Superior

What are some memory devices you already know?


In small groups, share your memory aids. Write the ones which are new to you.


Discuss with your group what is needed to create a good memory aid.
Organization

Organization is keeping track of ideas, papers, things that need to be done, and time in a systematic way. How you organize may be different than how someone else organizes. This is the organization symbol used in the course. When you see it, check how organized you are.

Studies show that one of the keys to success is being organized. On a scale of 1 to 10 (1 being low, and 10 being high) how would you rate your organization skills?


In terms of organization, what is your greatest strength?


What is your greatest weakness?


What can you do to improve?


Reading Strategies

1. Preview
   Look over the text. Look at the title, subtitles, table of contents, index, glossary, and illustrations.

2. Question
   Answer “What do I need to know?” by asking the 5 W’s (Who, What, When, Where, Why) and How.

3. Skim
   Read information quickly to get the main idea.

   Skim Text
   • Look for words that are bold, in italics, or underlined.
   • Read the first and last sentences in each paragraph.

   Skim Graphics (charts, tables...)
   • Look for titles, keys, legends, and other blocks of information in columns, rows, and corners.
Preview

This is the *preview* symbol used throughout the course. When you see it, practice previewing the chapter.

Preview by reading the titles and subtitles in a document or chapter to find the major concepts. Previewing also includes asking yourself what you know and don’t know about these major concepts.

1. Take five minutes and preview the entire manual. List the major concepts.

   __________________________________________
   __________________________________________
   __________________________________________

2. Compare your list with a partner. Did you come up with the same list? Why or why not?

   __________________________________________
   __________________________________________
   __________________________________________

3. Which concepts on your list are unfamiliar to you? Highlight these.
Question

This is the question symbol used throughout the course. When you see it, answer the stated question or come up with a question of your own.

Question what you need to know by identifying the 5 W's and How:

- Preview this manual and create some questions using the 5 W's and How.
  Ask, for example, "What do I need to know? Where can I use this information? How can I use this information?"

- Create your own questions with the 5 W's and How.

Who ____________________________________________
______________________________________________ ?

What __________________________________________
______________________________________________ ?

When __________________________________________
______________________________________________ ?

Where _________________________________________
______________________________________________ ?

Why __________________________________________
______________________________________________ ?

How __________________________________________
______________________________________________ ?
Skim

This is the *skim* symbol used throughout the text. When you see it, practice skimming the information instead of reading it thoroughly.

Skim by reading information quickly to get the main idea.

Imagine that the following is a whole page of text. The blanks are the words you don’t read when you are skimming.

Usually, the first paragraph will be read all the way through at average speed. It will contain an overview of what will be talked about in the following paragraphs.

Sometimes the second paragraph contains some important information, so read this as well.

Read the first ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ..., ...
Classroom Strategies

1. **Facilitator Guide**
   Tips and instructions for facilitators.

2. **Overhead**
   Used to emphasize and clarify concepts.

3. **Activity**
   Individual, partner, or group skill-building exercise.

4. **Participant Feedback**
   For confidential communication between facilitator and participant.
Facilitator Guide Pages

When you see this symbol, use these ideas in your training, or come up with your own.

*Facilitator guide pages* are blue. They are inserted into the facilitator's guide to offer suggestions and guidance.

These pages are structured to help you facilitate the course information.

Facilitator tips are included on each of the pages. Use these pages and tips, but don’t hesitate to be creative when adapting them to your particular learning environment.
Overhead

When you see this symbol, use the enclosed overheads or make your own.

An overhead is a transparency copied from the text and used with an overhead machine. It provides a visual for examining details.

- Use overheads to emphasize, illustrate, or introduce a concept. Visuals are more effective than discussion only.

- Use colored transparency markers to highlight information.

- Ask volunteer participants to point out important information on overheads. (Peer teaching is a valuable learning strategy.)

- Make certain that all overheads can be read by everyone in the room.
Activity

When you see this symbol, allow the participants to complete the text activity or create another.

Use an *activity* to challenge learners and provide opportunities for learners to solve problems together.

- Alternate participant activity setups. Use whole group, small group, partnered, and individual activities.

- Be creative! Come up with your own activities or use suggestions from the participants if the activities are too short, too long, or not appropriate for you participants.

- Think about the activities that have worked well for you in your own learning. Why have they worked? Transfer those elements to the activities of the participants.
Participant Feedback

When you see this symbol, usually at the end of a chapter, give each participant a feedback sheet.

*Participant Feedback* sheets enable participants to assess both their own learning and the facilitation of course material. Feedback is essential for effective communication both in training and work.

- Collect the completed Feedback sheets, initial, date, and write responses on each form. This technique allows the learners to have ongoing, one-on-one communication with the facilitator.

- Encourage participants to communicate their thoughts and feelings, and to be honest. Positive feedback is great, but negative feedback can be the basis for improved facilitation. Do the negative comments have merit? If so, what can you do to improve? You can change the pace of a class, develop more practice exercises, and defuse any negative thought or feelings.
Introductory Activity

Have participants choose partners.

Ask: What do you already know about this print just by skimming? Make a list with your partner.

Do one example as a group first.

Ask: For example, what company owns this print?

If participants have difficulty getting started, prompt them with the following questions.

Ask: • Are there tolerances given on this print?
  • Have you seen this part before? What is it?
  • Has the print been revised?
  • Do you know any of the line types?
  • What’s the material used in this part?

Facilitator Tip

Some participants will know more than others. Try to have these experts explain ideas as much or even more than you do. Peer tutoring is a powerful learning tool.
Introductory Activity

Tell Us What You Know

With a partner, locate anything that you already know something about from the print on the following page. List below.

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________

__________________________________________________________________________
### Table: Part Numbers and Sheared Lengths

<table>
<thead>
<tr>
<th>PART NO.</th>
</tr>
</thead>
<tbody>
<tr>
<td>34BA4003A01</td>
</tr>
<tr>
<td>34BA4003B01</td>
</tr>
<tr>
<td>34BA4003C01</td>
</tr>
<tr>
<td>34BA4003D01</td>
</tr>
<tr>
<td>34BA4003E01</td>
</tr>
<tr>
<td>34BA4003F01</td>
</tr>
<tr>
<td>34BA4003G01</td>
</tr>
<tr>
<td>34BA4003H01</td>
</tr>
<tr>
<td>34BA4003I01</td>
</tr>
<tr>
<td>34BA4003J01</td>
</tr>
<tr>
<td>34BA4003K01</td>
</tr>
<tr>
<td>34BA4003L01</td>
</tr>
<tr>
<td>34BA4003M01</td>
</tr>
<tr>
<td>34BA4003N01</td>
</tr>
<tr>
<td>34BA4003O01</td>
</tr>
<tr>
<td>34BA4003P01</td>
</tr>
<tr>
<td>34BA4003Q01</td>
</tr>
<tr>
<td>34BA4003R01</td>
</tr>
<tr>
<td>34BA4003S01</td>
</tr>
<tr>
<td>34BA4003T01</td>
</tr>
<tr>
<td>34BA4003U01</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LENGTH (IN)</th>
<th>SHEARED LENGTH (IN)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8.22</td>
<td>14.56</td>
</tr>
<tr>
<td>9.22</td>
<td>15.56</td>
</tr>
<tr>
<td>10.22</td>
<td>16.56</td>
</tr>
<tr>
<td>8.81</td>
<td>15.15</td>
</tr>
<tr>
<td>9.81</td>
<td>16.15</td>
</tr>
<tr>
<td>10.81</td>
<td>17.15</td>
</tr>
<tr>
<td>9.72</td>
<td>16.06</td>
</tr>
<tr>
<td>8.72</td>
<td>15.06</td>
</tr>
<tr>
<td>8.84</td>
<td>15.18</td>
</tr>
<tr>
<td>8.13</td>
<td>14.46</td>
</tr>
<tr>
<td>8.38</td>
<td>14.71</td>
</tr>
<tr>
<td>8.75</td>
<td>15.09</td>
</tr>
<tr>
<td>9.63</td>
<td>15.96</td>
</tr>
<tr>
<td>10.13</td>
<td>16.43</td>
</tr>
<tr>
<td>7.97</td>
<td>14.31</td>
</tr>
<tr>
<td>8.59</td>
<td>14.93</td>
</tr>
<tr>
<td>9.47</td>
<td>15.81</td>
</tr>
<tr>
<td>9.97</td>
<td>16.31</td>
</tr>
</tbody>
</table>

**BEST COPY AVAILABLE**

**X TOOLING LIMITS:**
- **MIN:** 7.72
- **MAX:** 10.22

**MACH. TOL. UNLESS SPEC:**
- **2 PLC DECIMALS:** ±.002
- **4 PLC DECIMALS:** ±.0005
- **ANG:** ±.5° **RADII:** .015

**SCALE:** 50

**XYZ Company**

**FILE:** AAA00011016

**TDR:** 0071189

**RESILIENT BASE - MCHA 56**
**Preview**

Preview the chapter with the participants. Refer to the Preview Process Page in the process section at the beginning of the text.

**Ask:** *Why are these guidelines important?*

Brainstorm answers on a flipchart and ask participants to list the responses on the back of their page.

**Facilitator Tip**

Don’t be afraid to make errors. Create an environment where it’s okay for both participants and facilitators to make and correct mistakes. Both are important parts of the learning process.
The Title Block and Alphanumerics

Objectives

- To identify the title block on a blueprint and know what each title block component means.
- To become familiar with an alphanumeristic system.

The title block is framed information on a blueprint that gives specific facts about that print. Always examine the title block first when looking at a print.

Alphanumerics are letters and numbers organized in a systematic way. An alphanumeristic system helps a company keep track of information.

Blueprint Guidelines

- Never get in the habit of memorizing a drawing.
- Always keep only the latest change drawing in the file.
- Always read and understand all notes on a print before you start working.
- Always examine the title block first.
**Key Words**

Refer participants to Key Word Learning Strategies section page at the beginning of the Facilitator Guide Sample.

**Ask:** *Why do you need to know the information on the Title Block?*

*What information is given on a Title Block?*

As participants answer, have them highlight the main words from each definition (Example: #3 Revisions = changes) Do not have them highlight whole definitions, paragraphs, or pages.

**Facilitator Tips**

Encourage participants to use highlighters *selectively*. Highlighting every bit of text has the same effect as not highlighting anything at all.

Of all classroom strategies, lecturing provides for the lowest retention rate. *Ask questions!* Do what you can to get the participants talking about the content.
The Title Block

The title block consists of sub-blocks of information and is similar from company to company. The numbers below correspond to the drawing on the next page.

1. Tolerance Block—Space that provides tolerances on the print.

2. Material (MATL)—Item used to make part.

3. Revisions (REV)—Changes made to original drawing. Letter of the alphabet indicates the number of revisions. A = 1, B = 2, C = 3 . . . . Revision Blocks list revisions.

4. File—Indicates drawing control number.

5. TDR—Technical Data Release.


7. Drafter (BY)—Initials of person who created blueprint.

8. Scale—The relationship of the size of the image on the drawing to the actual object.

9. Title of Drawing—The complete name of the drawing.

10. Company Name—The name of the company that produced the drawing.

11. Revision Date—The date of the latest revision.
MACH. TOL. UNLESS SPEC.
2 PLC DECIMALS = ±0.020
3 PLC DECIMALS = ±0.005
ANG = .5° RADIUS = .015

XYZ Company

TITLE BLOCK #1

FAN HOUSING FOR 35 FRAME VERT. MOTOR W/O GREASER BLOT

FILE: AAA00003659
REVISED: 08/11/93
UNIT: .001
TOLERANCES:
R.25
.25
R.78
.28
R.16
.015

R.69
7.06 I.D.
6.62 (REF.) DIA.
1.62

.56

3 HOLES 8120'
.25 DIA.
Title Block #1 Activity—Drawing #35FH4000A01

1. What are the allowable tolerances for making this part?

   A. Angle allowance = 

   B. Decimals to three places = 

   C. Decimals to two places = 

2. What is the material used for fabrication? 

3. How many times has the drawing has been revised? 

4. What is the relationship of the size of the drawing to the real object? 

5. Who is the drafter? 

6. What is the date of the latest revision? 

7. What is the file number, for drawing control? 

8. What is the function of the TDR number (Technical Data Release)? 

9. What is the company name? 

10. Is this a piece-part or subassembly drawing? 

11. What is the drawing number?
Title Block #2 Activity—Drawing #54FE5000

Turn to Drawing #54FE5000, End Cap Brush Assembly. All title blocks have some features in common and some differences. For example, Title Block #1 refers to a piece-part, a drawing which illustrates one part. Title Block #2 refers to a sub-assembly, a drawing which illustrates several components.

Make a list of the similarities and differences between Title Blocks #1 and #2.

Title Blocks #1 & #2 Activity

Similarities:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________

Differences:

________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
________________________________________________________________________
**Similarities and Differences Activity**

Have participants divide into pairs. Allow the pairs ten minutes to find as many similarities and differences as possible. When ten minutes are up, ask the following questions to the entire group.

Ask: *First, what similarities did you find between the two prints?*
As participants answer, record their responses on the overhead.

Ask: *What differences did you find? (Record these also)*

Ask: *What does this tell you about title blocks in general?*

**Facilitator Tip**

Try partnered activities as a way to encourage teamwork. If the partnered activities aren’t successful, try whole group and/or individual ones. Variety in how you conduct activities is essential.
PART NO. | "A"  
---|---
EB000058B-00 | 1.760
EB000058B-01 | 1.395

NOTES:

- DIMENSION 'A' is symmetrical with flange of end cap.
- Apply small bead of item 6 around each brush holder before installing.
- Apply item 7 to inside of end cap before assembly.

BEST COPY AVAILABLE
Notes

*Notes* contain special instructions and appear outside the title block.

Look to the left of the title block on drawing #54FE5000 for two circles (balloons) and three triangles (flags). What do these shapes mean?

**Balloons and Flags**

*Balloons.* Some companies use a *balloon system* to illustrate how the piece-parts from the Bill of Materials work together.

1. How many piece-parts are in this sub-assembly? ___________

*Flags.* Some companies use triangular flags to highlight either a work procedure, a nontypical material, or a note.

2. In Flag #2 (under Notes) what do you suppose Item 6 might be?

   _______________________________________

3. What is the assembler in Flag #3 being instructed to do? ______

   _______________________________________
Balloon and Flag Activity

For the balloon and flag activity, highlight the balloons in one color and the flags in another on the transparency.

Have participants highlight the balloons and flags in the same way on their copy.

Ask:
• When would you see a flag on a print?
• When would you see a balloon?
• How is flag #2 connected to balloon #6?
• Have you ever seen a balloon in a piece-part drawing? Why or why not?

Facilitator Tip

Use color as much as possible. According to one study, color increases retention by 55%.
Title Block #3 Activity—Frame Information

Note the four columns of numbers and letters immediately above the title block on Drawing #35RC0002. Column 3 is entitled, “Finished ‘A’ Length,” and Column 4 is entitled “Cut-Off ‘A’ Length.” For Frame 516, the cut-off length is 2.14 and the finished length is 2.090.

1. What is the difference in length between the two? ______

2. Why is there a difference in the length? ______________

3. Who is the drafter of this drawing? ______________

4. What part is being illustrated? ______________

5. What material is being used? ______________

6. How many revisions has this drawing gone through? ______

7. What is the largest frame size? ______________

Challenge

8. Why are there eight different frame sizes listed on this print?

   ______________
   ______________
   ______________
<table>
<thead>
<tr>
<th>FRAME</th>
<th>SUFFIX</th>
<th>FINISHED 'A' LENGTH</th>
<th>CUT-OFF 'A' LENGTH</th>
</tr>
</thead>
<tbody>
<tr>
<td>516</td>
<td>A01</td>
<td>2.090</td>
<td>2.14</td>
</tr>
<tr>
<td>524</td>
<td>A02</td>
<td>3.177</td>
<td>3.22</td>
</tr>
<tr>
<td>532</td>
<td>A03</td>
<td>4.185</td>
<td>4.23</td>
</tr>
<tr>
<td>540</td>
<td>A04</td>
<td>5.272</td>
<td>5.32</td>
</tr>
<tr>
<td>548</td>
<td>A05</td>
<td>6.359</td>
<td>6.41</td>
</tr>
<tr>
<td>556</td>
<td>A06</td>
<td>7.367</td>
<td>7.41</td>
</tr>
<tr>
<td>564</td>
<td>A07</td>
<td>8.454</td>
<td>8.50</td>
</tr>
<tr>
<td>580</td>
<td>A08</td>
<td>10.549</td>
<td>10.60</td>
</tr>
</tbody>
</table>

0.03x45° CHAMFER BOTH ENDS

APR 18 1994

XYZ Company

TITLE BLOCK #3

MATL: HOT DRAWN SEAMLESS STEEL TUBING
REV: H CORRECTED TOLERANCES

SCALE: 3/4
FILE: AAA00000083
PAGE: 54
Blueprint Activity

Answer the following questions with Drawing #37FH4000A01 on the next page.

1. What is the part number? ____________________________

2. What is the name of this part? ________________________

3. Who made this drawing? _____________________________

4. How many revisions has this drawing had? ______________

5. Is this drawing a piece-part or a sub-assembly? __________

6. What is the date of the last revision? _________________

7. What is the scale of this drawing? ____________________

Challenge

8. What does the FH stand for? _________________________
Alphanumeric Activities

If participants have difficulty guessing what these terms mean, Ask:

- *What other words include the term alpha?* (alphabet)
- *Does the term numeric remind you of another word?* (number)
- *What does sequential mean? What is a sequence?* (1, 2, 3, order)
- *What is something that is significant?* (has meaning of its own)
- *What examples of significant numbers do you see every day? What sequential numbers do you see every day?*

Facilitator Tip

Encourage participants to use word associations early in the training. These will be used again in the chapter 3 discussion of tolerances.
NOTE:
GRILLE DIMPLES & 3 MOUNTING HOLES BY BALDOR.

MACH. TOL UNLESS SPEC.
2 PLC DECIMALS = .020
3 PLC DECIMALS = .005
ANG=2.5° RADII=.015

REVISED: 10/11/94
FILE: AAA00002397
TOR: 0062626
XYZ Company

FAN COVER 37/357 FRAME W/GREASER
Tools for Learning

**Alphanumeric Systems**

Many companies use several *alphanumeric* systems.

What does *alpha* mean? ________________________________

What does *numeric* mean? ________________________________

The numbers in an alphanumeric system can be either *sequential* or *significant*. *Sequential* means that whatever is being categorized is listed in "1, 2, 3..." order.

*Significant* means that the numbers and letters in the system have meaning. Drawing 35RC0002 illustrates how numbers and letters are used together: 35 and RC are *significant*. The 0002 is *sequential*.

Are the following numbers significant or sequential?

Area Code ____________________________________________

Zip Code ____________________________________________

The Dewey Decimal System ________________________________________

Check Numbers ____________________________________________
### Abbreviations

Knowing company *abbreviations* can help to quickly identify what is on a drawing. The XYZ abbreviations, which are significant, are divided into three categories (by department):

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>SH</td>
<td>Shaft</td>
</tr>
<tr>
<td>RC</td>
<td>Rotor Core</td>
</tr>
<tr>
<td>EP</td>
<td>Endplate</td>
</tr>
<tr>
<td>SC</td>
<td>Stator Core</td>
</tr>
<tr>
<td>WS</td>
<td>Wound Stator</td>
</tr>
<tr>
<td>SB</td>
<td>Stator Band</td>
</tr>
<tr>
<td>SA</td>
<td>Stator Assembly</td>
</tr>
<tr>
<td>RA</td>
<td>Rotor Assembly</td>
</tr>
<tr>
<td>AA</td>
<td>Armature Assembly</td>
</tr>
<tr>
<td>NS</td>
<td>Insulation</td>
</tr>
<tr>
<td>CM</td>
<td>Commutator</td>
</tr>
<tr>
<td>LD</td>
<td>Lead Assembly</td>
</tr>
<tr>
<td>CL</td>
<td>Coil</td>
</tr>
<tr>
<td>BP</td>
<td>Brush/Brush Holder</td>
</tr>
<tr>
<td>RK</td>
<td>Rocker Arm</td>
</tr>
</tbody>
</table>
Facilitator's Guide Sample — Basic Blueprint Reading (Chapter One)

Tools for Learning

**Key Term**

**Parts**

- BA  Base
- FH  Fan Housing
- CB  Conduit Box
- CV  Inspection Cover
- RB  Bearing Retainers
- FN  Fan
- HA  Hardware or Housing Adaptor

**Lamination**

- RL  Rotor Lamination
- SL  Stator Lamination
- AL  Armature Lamination
- FL  Field Lamination
- MM  Master Coil Lamination
- T###  Tool Number

Highlight the abbreviations which are unfamiliar to you.
Memory Tricks

Because there may be many abbreviations in a company’s alphanumerical system, creating memory tricks can be helpful.

For example, the directions on a compass can be remembered by:

Never Eat Shredded Wheat.

(North, East, South, West)

XYZ’s Alphanumeric MM for Master Coil Lamination can be thought of as:

MCL (the name Michael) likes MMs (the candy).

(MCL = MM)

Look at the list of abbreviations. Choose one and create a saying to help you remember it.
Part Number/Drawing Number

An XYZ part number and drawing number are often the same. This type of alphanumeric system is not used in all companies.

Once you are familiar with how to break down a part number in one department, you will be better able to understand the alphanumerics in other departments.

For example, Drawing 34FH4000A01 can be broken down into the following categories:

34 = Frame
FH = Fan Cover or Housing
4000 = Material Used (steel)
A01 = Sequential number for variations to 34FH4000

A drawing number in Laminations would break down as:

09 = Frame
RL = Rotor Lamination
5 = Pole Number
64 = Number of Slots
1–9 or E = A sequential number or E (experimental)
Another variation to this system is number 27A01W234:

27 = Frame
A01 = Mechanical Layout
W234 = Electrical Layout

What drawing number are you most familiar with in your department?

________________________________________

Break down this alphanumeric like the examples above. What do the numbers and letters mean?

________________________________________

________________________________________

________________________________________

________________________________________

Circle the sequential numbers in your example. Box the significant numbers.

In the examples, two different meanings are given for an A01. How will you know which is which?

________________________________________

________________________________________
Questions and Exceptions to the Alphanumeric System

Questions and exceptions to the alphanumeric system are bound to come up in discussion. As with any training, have a contact person at the company who can be available to answer your questions.

Some of the XYZ part numbers won't match the system outlined in Chapter 1. For example, the Charlotte plant was recently purchased and operates under a different alphanumeric system.

Facilitator Tip

How can you encourage participants to learn all the company abbreviations?

- Allow small groups of participants to create a mini-quiz for other teams. Have teams trade questions and see which team knows the most answers.

- Sponsor an abbreviation contest. Give participants time in or out of class to create memory aids. Award the winning creator or team of creators a prize. Have a panel of participant judges if possible.

- Create a job aid with the abbreviations. Copy information on 3 x 5 inch cards and distribute to all participants. Or have participants create this job aid.
Activity

Chapter 1 of this course included the following prints.

1. Break down each of these alphanumerics.
   
   A. 35FH4000A01

   35
   F
   H
   4000
   A
   01

   B. 35RC0002

   35
   R
   C
   0002

2. Where would you look to find the exact material type for the
   4000 in question 1?

3. What is that material type?

4. What is the 0002 material type in question 2?

5. How would you break down 29FL4240?
Basic Blueprint Reading Chapter 1 Review

1. How is a piece-part drawing different from a sub-assembly drawing?

________________________________________________________________________

________________________________________________________________________

2. What information does a Title Block provide? (at least three)

a. ______________________________________

b. ______________________________________

c. ______________________________________

3. Answer the questions with the blueprint on the following page.

a. What is the drawing number? ________________________________

b. What does the “SH” mean? ________________________________

c. When was the original print drawn? ________________________

d. How many revisions has it had? ____________________________

e. Who approved this drawing? ______________________________
f. How many flags are on this drawing? ________________

g. How much tolerance is allowed to two decimal places under the English system? 

h. What material is used in this part? ________________

4. Identify the following abbreviations.
   a. RC ________________
   b. BA ________________
   c. EP ________________
   d. SL ________________
   e. MM ________________
   f. AL ________________
   g. RK ________________
   h. CV ________________
   i. SH ________________
   j. FH ________________
5. Break down the following part numbers:

a. 34BA4003

b. 14RL2401
SHAFT

XYZ Company

BEST COPY AVAILABLE

DWG. NO. 545HCCG3GC1 REV. T

TOLERANCES

UNLESS OTHERWISE SPECIFIED

<table>
<thead>
<tr>
<th>ENGLISH</th>
<th>METRIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>DEC. 1.00 ± .01</td>
<td>MN. (0.00) ± .02</td>
</tr>
<tr>
<td>DEC. 1.000 ± .005</td>
<td>MN. (0.000) ± .127</td>
</tr>
<tr>
<td>ANGLES DEC. ± 1/2&quot;</td>
<td>FRAC. ± 1/32</td>
</tr>
<tr>
<td>ALL RADIUS .015</td>
<td>BREAK ALL SHARP EDGES .015</td>
</tr>
<tr>
<td>MACHINED SURFACES 100 / R.M.S. MAX.</td>
<td></td>
</tr>
</tbody>
</table>

SIGNATURES | DATE | TITLE
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>J. MERCHANT</td>
<td>11/15/88</td>
<td>SHAFT</td>
</tr>
</tbody>
</table>

MATERIAL: STRESSPROOF STEEL 4-311 OR 1144

HARDNESS: H.B.

NEXT ASSY.: 2/14/89

USED ON: 4060

Drawing by J.M. MERCHANT

DATE: 2/14/89

APPROVALS:

CHARGE

E.C.O. NO. REV.

1173 T

REVISE GEOMETRIC DIMENSIONS, SEE ECO REPORT

CHANGE

DATE APPR

1/17/84

R.F.A.

7/14/89

A1

A2

.6250

875

7.915

8.670

MAX 32/

(2) .040

(2) .041 ± .002

Ø .6250

REF.

(2) .094 ± .002

.630

.628

0.!88 ± .001

.517 ± .002

(2) 75° TYP

(2) 105° TYP

SECTION B - B (SHADING DETAILS)

SEE DETAIL "C"

SEE DETAIL "C"

NOTE: BALDOR ELECTRIC CO. THIS DRAWING IS THE PROPERTY OF BALDOR ELECTRIC CO., IT IS FURNISHED TO YOU FOR CONFIDENTIAL INFORMATION PURPOSES ONLY AND IS NOT TO BE REPRODUCED OR USED FOR MANUFACTURING PURPOSES WITHOUT THE EXPRESS WRITTEN PERMISSION OF BALDOR ELECTRIC CO. *
## Chapter 1 Answers

### Title Block #1 Activity, Page 3

1. A. Bend radius: 015  
   B. Angle: 0.5  
   C. Two-place decimals: +/- .020  
2. 18 Gage C.R. Steel (.0478)  
3. C = 3 times  
4. The drawing is .6 to the fan housing’s true size.  
5. PGM  
6. 8/11/93  
7. AAA00003659  
8. To match this print to the actual TDR documents  
9. XYZ Electric Company  
10. Piece-part. If other parts were shown and how they work together, this print would be a sub-assembly.  
11. 35FH4000A01

### Title Block #2 Activity, Page 4

1. Similarities: (Answers may vary.)  
   - Both have a title block.  
   - Both list tolerances.  
   - Both have had same # of revisions.  
   - Both have numbers in decimal form.  
   - Both have drafter's initials given.  
   (etc.)  
2. Differences: (Answers may vary.)  
   - Different scales  
   - Metric tolerances are given on one print.  
   - One has a “checked by” box.  
   - One has balloons and flags.  
   (etc.)

### Balloons and Flags, Page 5

1. 11  
2. Adhesive  
3. Apply Item 7 to insides of end cap before assembly.

### Title Block #3 Activity, Page 6

1. .05  
2. The finished length has been machined.  
3. DMB  
4. Rotor core  
   (Continued at top of the next column)

### Title Block #3 Activity, Cont’d, Page 6

5. Hot drawn seamless steel tubing  
6. 8  
7. 580  
8. To save the company from having to create 8 different prints for the same part.

### Blueprint Activity, Page 7

1. 37FH4000A01  
2. Fan cover 37/307 Frame w/greaser  
3. BGM  
4. 5  
5. piece-part  
6. 10/11/94  
7. 7  
8. Fan housing or fan cover

### Alphanumeric Systems, Page 8

1. Alpha refers to ordering information by letter order.  
2. Numeric refers to ordering information by number.

### Part Number Activity, Page 14

1. A. 35 = Frame  
   - FH = Fan Housing or Cover  
   - 4000 = Material Type  
   - A01 = Variations  
   B. 35 = Frame  
   - RC = Rotor Core  
   - 0002 = Material Type  
2. On the title block  
3. 18 gauge C.R. Steel  
4. Hot Drawn Seamless Steel Tubing  
5. 29 = Frame  
   - FL = Field Lamination  
   - 4 = Poles  
   - 24 = Number of Slots  
   - 0 = Family Group (a sequential number 1-9 or E for experimental)
Chapter 1 Answers

Chapter 1 Review, Page 15

1. A piece-part drawing displays a part which may include several views. A sub-assembly displays how multiple parts fit together.

2. (Answers may vary.)
   a. Company Name
   b. Revisions
   c. Drafter's Initials

3. a. 54SH0003G01
   b. Shaft
   c. 11/15/88
   d. 20
   e. RFA
   f. 2
   g. +/- .01
   h. Stress-proof Steel

4. a. RC Rotor Core
   b. BA Base
   c. EP Endplate
   d. SL Stator Lamination
   e. MM Master Coil Lamination
   f. AL Armature Lamination
   g. RK Rocker Armature
   h. CV Inspection Cover
   i. SH Shaft
   j. FH Fan Housing or Cover

5. a. 34BA4003
   34 = Frame Size
   BA = Base
   4003 = Material

   b. 14RL2401
   14 = Frame Size
   RL = Rotor Lamination
   2 = Poles
   40 = Slots
   1 = Family Group
Checkpoints and Response Sheets

Checkpoints

Grade the checkpoints together in class and have participants score and correct their own answers.

Checkpoint answer sheets are not included in the Participant's Guide, but are included in the Facilitator's Guide.

Participants should keep their checkpoint quizzes for reviewing all chapters at the end of the course.

Response Sheets

At the end of each chapter, give participants time to complete response sheets. Collect and write brief notes on each participant's sheet. Hand back at next session.

Facilitator Tip

Carefully consider the participants' responses—the good, the bad, and the ugly. What changes can you make so that Chapter 2 will be even more effective?
Checkpoint 1

The Title Block and Alphanumeric Systems

1. Answer the following questions with the attached blueprint.
   a. What is the drawing number? ________________________________
   b. What does the “SH” in the drawing number mean? ________________
   c. When was the original drawing made? (date) ___________________
   d. How many revisions has it undergone? _________________________
   e. What is the name of this part? ________________________________
   f. What change was made in Rev. “D”? __________________________
   g. When was Rev. D made? _________________________________
   h. How many frame sizes can shaft A01 have? ________________
   i. Which frame size is larger: C01 or B01? ______________________
   j. What is the tolerance allowed to three decimal places? (+/-) ______
   k. What drawing does this drawing replace? (date) ________________
   l. When did this drawing become effective for use in final assembly? ______
2. Identify the common abbreviations.
   a. SH
   b. AL
   c. BA
   d. MM
   e. FH

3. Break down the following alphanumerics:
   a. 28FL4041

   b. 36FH400A01
EFFECTIVE

NOV 26 1991

FINAL ASSEMBLY

XYZ Company

SPECIAL SHAFT - TEFC

MODEL 35M - NEMA 56CZ
Checkpoint 1 Answers

Chapter 1 — Title Block and Alphanumeric System

1a. 35SH1449
1b. Shaft
1c. 1/18/86
1d. 6
1e. Special Shaft - TEFC model 35M - NEMA 56CZ
1f. Keyway length was changed from 2.12
1g. 12/11/87
1h. 4
1i. C01
1j. .005
1k. 7/25/83
1l. November 26 1991
<table>
<thead>
<tr>
<th>Code</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>2a. SH</td>
<td>Shaft</td>
</tr>
<tr>
<td>2b. AL</td>
<td>Armature Lamination</td>
</tr>
<tr>
<td>2c. BA</td>
<td>Base</td>
</tr>
<tr>
<td>2d. MM</td>
<td>Master Coil Lamination</td>
</tr>
<tr>
<td>2e. FH</td>
<td>Fan Housing or Fan Cover</td>
</tr>
<tr>
<td>3a. 28</td>
<td>Frame Size</td>
</tr>
<tr>
<td>FL</td>
<td>Field Lamination</td>
</tr>
<tr>
<td>4</td>
<td>Poles</td>
</tr>
<tr>
<td>04</td>
<td>Slots</td>
</tr>
<tr>
<td>1</td>
<td>Family Group</td>
</tr>
<tr>
<td>3b. 36</td>
<td>Frame Size</td>
</tr>
<tr>
<td>FH</td>
<td>Fan Housing or Fan Cover</td>
</tr>
<tr>
<td>400</td>
<td>Material</td>
</tr>
<tr>
<td>A01</td>
<td>Variations</td>
</tr>
</tbody>
</table>

25 questions = 4 points per question
Participant Score Sheet

Record your Checkpoint scores on this sheet for your own reference. (Not required.)

Chapter 1 Checkpoint Score

Chapter 1 Areas to Work on

Chapter 2 Checkpoint Score

Chapter 2 Areas to Work on

Chapter 3 Checkpoint Score

Chapter 3 Areas to Work on

Chapter 4 Checkpoint Score

Chapter 4 Areas to Work on
Participant Feedback

Chapter ________ Class Time and Date ______________________

Name ________________________________________________

1. What problems are you having with this chapter? How can we help?

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

2. How will you be able to use this information on the floor?

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________

3. What can be done to improve this course?

_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
_________________________________________________________________
How Are You Doing?

Check the boxes of the habits you notice in the participants.

Do they:

- Listen effectively?
- Make eye contact comfortably with you and other participants?
- Share their ideas constructively?
- Ask effective questions?
- Help each other?
- Appear to understand the content?

If so, congratulations on your successful facilitation!

On the other hand, do participants:

- Tap pencils and fingers often?
- Avoid eye contact?
- Get off the subject?
- Claim to have forgotten their glasses and not complete activities/assignments?
- Refuse to participate?

These may indicate a learning difficulty. Be a detective and try to find out more from the participant.
Follow-Up Checklist

Immediately after training:

- Do supervisors have access to blueprints? ☐
- Are prints available for all other employees? ☐
- Is there a current job board where prints are displayed? ☐
- Do the employees know whom to contact for answers to blueprint questions? ☐

One month after training:

- Have you scheduled a follow-up assessment to check retention? ☐
- Has the training impacted production? ☐
- Have you found a need for additional training? ☐

Are employees able to:

- Identify production problems? ☐
- Report problems accurately? ☐
- Solve problems using blueprint knowledge? ☐
Participant’s Guide Sample

Train the Trainer

Assuring Learner Success

This section of the manual provides you with a complete set of learner’s materials without the Facilitator’s Guide pages. You may duplicate this set for your own classes.
**Introductory Activity**

**Tell Us What You Know**

With a partner, locate anything that you already know something about from the print on the following page. List below.

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________

________________________________________________________________________
The Title Block and Alphanumerics

Objectives

- To identify the title block on a blueprint and know what each title block component means.
- To become familiar with an alphanumerical system.

The title block is framed information on a blueprint that gives specific facts about that print. Always examine the title block first when looking at a print.

Alphanumericals are letters and numbers organized in a systematic way. An alphanumerical system helps a company keep track of information.

Blueprint Guidelines

- Never get in the habit of memorizing a drawing.
- Always keep only the latest change drawing in the file.
- Always read and understand all notes on a print before you start working.
- Always examine the title block first.

<table>
<thead>
<tr>
<th>DRAWING #</th>
<th>DRAWING #</th>
</tr>
</thead>
<tbody>
<tr>
<td>1/4&quot;-</td>
<td></td>
</tr>
<tr>
<td>PART/ASSEMBLY DRAWING</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>NOTES</th>
<th>TITLE BLOCK</th>
</tr>
</thead>
</table>
The Title Block

The title block consists of sub-blocks of information and is similar from company to company. The numbers below correspond to the drawing on the next page.

1. Tolerance Block—Space that provides tolerances on the print.

2. Material (MATL)—Item used to make part.

3. Revisions (REV)—Changes made to original drawing. Letter of the alphabet indicates the number of revisions. A = 1, B = 2, C = 3 . . . . Revision Blocks list revisions.

4. File—Indicates drawing control number.

5. TDR—Technical Data Release.


7. Drafter (BY)—Initials of person who created blueprint.

8. Scale—The relationship of the size of the image on the drawing to the actual object.

9. Title of Drawing—The complete name of the drawing.

10. Company Name—The name of the company that produced the drawing.

11. Revision Date—The date of the latest revision.
TITL BLOCK #1

XYZ Company

TITLE: FAN HOUSING FOR 35 FRAME VERT MOTORS W/O GREASER SLOT

FILE: AAA000003659

REVD: 08/11/93

TDR: 0045283

Scale: .6

BY: PGM

REVISED: 08/11/93

FILE: AAA000003659

MACH. TOL. UNLESS SPEC.

2 PLC DECIMALS = ± .020

3 PLC DECIMALS = ± .005

ANG = .5° RADIUS = .015

3 HOLES Ø120

.25 DIA.

MATL: 18 GA. C.R. STEEL (.0475)

REVD: C UPDATED LY'S AND ADDED Mfg. SCREW GRPHCS

35FH4000A01
Title Block #1 Activity—Drawing #35FH4000A01

1. What are the allowable tolerances for making this part?
   A. Angle allowance = _______________________________
   B. Decimals to three places = _________________________
   C. Decimals to two places = _________________________

2. What is the material used for fabrication? _________________________

3. How many times has the drawing has been revised? _________________________

4. What is the relationship of the size of the drawing to the real object? _________________________

5. Who is the drafter? _________________________

6. What is the date of the latest revision? _________________________

7. What is the file number, for drawing control? _________________________

8. What is the function of the TDR number (Technical Data Release)? _________________________

9. What is the company name? _________________________

10. Is this a piece-part or subassembly drawing? _________________________

11. What is the drawing number? _________________________
Title Block #2 Activity—Drawing #54FE5000

Turn to Drawing #54FE5000, End Cap Brush Assembly. All title blocks have some features in common and some differences. For example, Title Block #1 refers to a *piece-part*, a drawing which illustrates one part. Title Block #2 refers to a *sub-assembly*, a drawing which illustrates several components.

Make a list of the similarities and differences between Title Blocks #1 and #2.

**Title Blocks #1 & #2 Activity**

**Similarities:**

________________________________________

________________________________________

________________________________________

**Differences:**

________________________________________

________________________________________

________________________________________

________________________________________
NOTES:

⚠️ DIMENSION 'A' IS SYMMETRICAL WITH CL OF END CAP.

⚠️ APPLY SMALL BEAD OF ITEM 6 AROUND EACH BRUSH HOLDER BEFORE INSTALLING.

⚠️ APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

1. APPLY SMALL BEAD OF ITEM 6 AROUND EACH BRUSH HOLDER BEFORE INSTALLING.
2. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.
3. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

4. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

5. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

6. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

7. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

8. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

9. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

10. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

11. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

12. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

13. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

14. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

15. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

16. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

17. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

18. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

19. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

20. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

21. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

22. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

23. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

24. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

25. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

26. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

27. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

28. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

29. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

30. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

31. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

32. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

33. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

34. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

35. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

36. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

37. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

38. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

39. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

40. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

41. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

42. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

43. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

44. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

45. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

46. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

47. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

48. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

49. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

50. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

51. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

52. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

53. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

54. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

55. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

56. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

57. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

58. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

59. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

60. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

61. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

62. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

63. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

64. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

65. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

66. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

67. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

68. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

69. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

70. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

71. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

72. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

73. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

74. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

75. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

76. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

77. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

78. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

79. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

80. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

81. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

82. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

83. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

84. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

85. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

86. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

87. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

88. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

89. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

90. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

91. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

92. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

93. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

94. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

95. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

96. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

97. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

98. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

99. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.

100. APPLY ITEM 7 TO INSIDE OF END CAP BEFORE ASSEMBLY.
Notes

Notes contain special instructions and appear outside the title block.

Look to the left of the title block on drawing #54FE5000 for two circles (balloons) and three triangles (flags). What do these shapes mean?

Balloons and Flags

Balloons. Some companies use a balloon system to illustrate how the piece-parts from the Bill of Materials work together.

1. How many piece-parts are in this sub-assembly? __________

Flags. Some companies use triangular flags to highlight either a work procedure, a nontypical material, or a note.

2. In Flag #2 (under Notes) what do you suppose Item 6 might be? __________

3. What is the assembler in Flag #3 being instructed to do? __________
Title Block #3 Activity—Frame Information

Note the four columns of numbers and letters immediately above the title block on Drawing #35RC0002. Column 3 is entitled, “Finished ‘A’ Length,” and Column 4 is entitled “Cut-Off ‘A’ Length.” For Frame 516, the cut-off length is 2.14 and the finished length is 2.090.

1. What is the difference in length between the two? __________

2. Why is there a difference in the length? ______________________

3. Who is the drafter of this drawing? ______________________

4. What part is being illustrated? ______________________

5. What material is being used? ______________________

6. How many revisions has this drawing gone through? ________

7. What is the largest frame size? ______________________

Challenge

8. Why are there eight different frame sizes listed on this print?

______________________________

______________________________

______________________________
Blueprint Activity

Answer the following questions with Drawing #37FH4000A01 on the next page.

1. What is the part number?

2. What is the name of this part?

3. Who made this drawing?

4. How many revisions has this drawing had?

5. Is this drawing a piece-part or a sub-assembly?

6. What is the date of the last revision?

7. What is the scale of this drawing?

Challenge

8. What does the FH stand for?
Alphanumeric Systems

Many companies use several *alphanumeric* systems.

What does *alpha* mean? ____________________________

What does *numeric* mean? ____________________________

The numbers in an alphanumeric system can be either *sequential* or *significant*. *Sequential* means that whatever is being categorized is listed in "1, 2, 3..." order.

*Significant* means that the numbers and letters in the system have meaning. Drawing 35RC0002 illustrates how numbers and letters are used together: 35 and RC are *significant*. The 0002 is *sequential*.

Are the following numbers significant or sequential?

Area Code ________________________________________

Zip Code ________________________________________

The Dewey Decimal System __________________________

Check Numbers _________________________________
Abbreviations

Knowing company abbreviations can help to quickly identify what is on a drawing. The XYZ abbreviations, which are significant, are divided into three categories (by department):

Motor

SH  Shaft
RC  Rotor Core
EP  Endplate
SC  Stator Core
WS  Wound Stator
SB  Stator Band
SA  Stator Assembly
RA  Rotor Assembly
AA  Armature Assembly
NS  Insulation
CM  Commutator
LD  Lead Assembly
CL  Coil
BP  Brush/Brush Holder
RK  Rocker Arm
Tools for Learning

Key Term

Parts

BA  Base
FH  Fan Housing
CB  Conduit Box
CV  Inspection Cover
RB  Bearing Retainers
FN  Fan
HA  Hardware or Housing Adaptor

Lamination

RL  Rotor Lamination
SL  Stator Lamination
AL  Armature Lamination
FL  Field Lamination
MM  Master Coil Lamination
T### Tool Number

Highlight the abbreviations which are unfamiliar to you.
Memory Tricks

Because there may be many abbreviations in a company’s alphanumeric system, creating memory tricks can be helpful.

For example, the directions on a compass can be remembered by:

Never Eat Shredded Wheat.

(North, East, South, West)

XYZ’s Alphanumeric MM for Master Coil Lamination can be thought of as:

MCL (the name Michael) likes MMMs (the candy).

(MCL = MM)

Look at the list of abbreviations. Choose one and create a saying to help you remember it.

____________________________________

____________________________________

____________________________________
Part Number/Drawing Number

An XYZ part number and drawing number are often the same. This type of alphanumeric system is not used in all companies.

Once you are familiar with how to break down a part number in one department, you will be better able to understand the alphanumerics in other departments.

For example, Drawing 34FH4000A01 can be broken down into the following categories:

34 = Frame
FH = Fan Cover or Housing
4000 = Material Used (steel)
A01 = Sequential number for variations to 34FH4000

A drawing number in Laminations would break down as:

09 = Frame
RL = Rotor Lamination
5 = Pole Number
64 = Number of Slots
1–9 or E = A sequential number or E (experimental)
Another variation to this system is number 27A01W234:

27 = Frame
A01 = Mechanical Layout
W234 = Electrical Layout

What drawing number are you most familiar with in your department?

______________________________

Break down this alphanumeric like the examples above. What do the numbers and letters mean?

______________________________

______________________________

______________________________

______________________________

Circle the sequential numbers in your example. Box the significant numbers.

In the examples, two different meanings are given for an A01. How will you know which is which?

______________________________
Activity

Chapter 1 of this course included the following prints.

1. Break down each of these alphanumerics.
   A. 35FH4000A01

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

   B. 35RC0002

   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________

2. Where would you look to find the exact material type for the 4000 in question 1?
   __________________________________________________________

3. What is that material type?
   __________________________________________________________

4. What is the 0002 material type in question 2?
   __________________________________________________________

5. How would you break down 29FL4240?
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
   __________________________________________________________
Basic Blueprint Reading Chapter 1 Review

1. How is a piece-part drawing different from a sub-assembly drawing?

2. What information does a Title Block provide? (at least three)
   a. 
   b. 
   c. 

3. Answer the questions with the blueprint on the following page.
   a. What is the drawing number? 
   b. What does the “SH” mean? 
   c. When was the original print drawn? 
   d. How many revisions has it had? 
   e. Who approved this drawing?
f. How many flags are on this drawing? ________________

g. How much tolerance is allowed to two decimal places under the English system? ________________

h. What material is used in this part? ___________________________________________

4. Identify the following abbreviations.

a. RC ___________________________________________

b. BA ___________________________________________

c. EP ___________________________________________

d. SL ___________________________________________

e. MM ___________________________________________

f. AL ___________________________________________

g. RK ___________________________________________

h. CV ___________________________________________

i. SH ___________________________________________

j. FH ___________________________________________
5. Break down the following part numbers:

a. 34BA4003

b. 14RL2401
**Chapter 1 Answers**

**Title Block #1 Activity, Page 3**

1. A. Bend radius: 015
   B. Angle: .5
   C. Two-place decimals: +/- .020

2. 18 Gage C.R. Steel (.0478)

3. C = 3 times

4. The drawing is .6 to the fan housing’s true size.

5. PGM

6. 8/11/93

7. AAA00003659

8. To match this print to the actual TDR documents

9. Baldor Electric Company

10. Piece-part. If other parts were shown and how they work together, this print would be a sub-assembly.

11. 35FH4000A01

**Title Block #2 Activity, Page 4**

1. Similarities: (Answers may vary.)
   - Both have a title block.
   - Both list tolerances.
   - Both have had same # of revisions.
   - Both have numbers in decimal form.
   - Both have drafter’s initials given.
   (etc.)

2. Differences: (Answers may vary.)
   - Different scales
   - Metric tolerances are given on one print.
   - One has a “checked by” box.
   - One has balloons and flags.
   (etc.)

**Balloons and Flags, Page 5**

1. 11

2. Adhesive

3. Apply Item 7 to insides of end cap before assembly.

**Title Block #3 Activity, Page 6**

1. .05

2. The finished length has been machined.

3. DMB

4. Rotor core

   (Continued at top of the next column)

**Title Block #3 Activity, Cont’d, Page 6**

5. Hot drawn seamless steel tubing

6. 8

7. 580

8. To save the company from having to create 8 different prints for the same part.

**Blueprint Activity, Page 7**

1. 37FH4000A01

2. Fan cover 37/307 Frame w/greaser

3. BGM

4. 5

5. piece-part

6. 10/11/94

7. 7

8. Fan housing or fan cover

**Alphanumeric Systems, Page 8**

1. *Alpha* refers to ordering information by letter order.

2. *Numeric* refers to ordering information by number.

**Part Number Activity, Page 14**

1. A. 35 = Frame
   
   FH = Fan Housing or Cover
   
   4000 = Material Type
   
   A01 = Variations

   B. 35 = Frame
   
   RC = Rotor Core
   
   0002 = Material Type

2. On the title block

3. 18 gauge C.R. Steel

4. Hot Drawn Seamless Steel Tubing

5. 29 = Frame

   FL = Field Lamination

   4 = Poles

   24 = Number of Slots

   0 = Family Group (a sequential number 1-9 or E for experimental)
## Chapter 1 Answers

### Chapter 1 Review, Page 15

1. A piece-part drawing displays a part which may include several views. A sub-assembly displays how multiple parts fit together.

2. (Answers may vary.)
   - a. Company Name
   - b. Revisions
   - c. Drafter's Initials

3. a. 54SH0003G01
   - b. Shaft
   - c. 11/15/88
   - d. 20
   - e. RFA
   - f. 2
   - g. +/- .01
   - h. Stress-proof Steel

4. a. RC  Rotor Core
   - b. BA  Base
   - c. EP  Endplate
   - d. SL  Stator Lamination
   - e. MM  Master Coil Lamination
   - f. AL  Armature Lamination
   - g. RK  Rocker Armature
   - h. CV  Inspection Cover
   - i. SH  Shaft
   - j. FH  Fan Housing or Cover

5. a. 34BA4003
   - 34 = Frame Size
   - BA = Base
   - 4003 = Material

   b. 14RL2401
   - 14 = Frame Size
   - RL = Rotor Lamination
   - 2 = Poles
   - 40 = Slots
   - 1 = Family Group
Checkpoint 1

The Title Block and Alphanumeric Systems

1. Answer the following questions with the attached blueprint.
   a. What is the drawing number? ____________________________
   b. What does the “SH” in the drawing number mean? ____________________________
   c. When was the original drawing made? (date) ____________________________
   d. How many revisions has it undergone? ____________________________
   e. What is the name of this part? ____________________________
   f. What change was made in Rev. “D”? ____________________________
   g. When was Rev. D made? ____________________________
   h. How many frame sizes can shaft A01 have? ____________________________
   i. Which frame size is larger: C01 or B01? ____________________________
   j. What is the tolerance allowed to three decimal places? (+/-) ____________________________
   k. What drawing does this drawing replace? (date) ____________________________
   l. When did this drawing become effective for use in final assembly? ____________________________
2. Identify the common abbreviations.
   a. SH
   b. AL
   c. BA
   d. MM
   e. FH

3. Break down the following alphanumerics:
   a. 28FL4041
   b. 36FH400A01
Participant Score Sheet

Record your Checkpoint scores on this sheet for your own reference. (Not required.)

Chapter 1 Checkpoint Score ___________________________

Chapter 1 Areas to Work on

__________________________
__________________________

Chapter 2 Checkpoint Score ___________________________

Chapter 2 Areas to Work on

__________________________
__________________________

Chapter 3 Checkpoint Score ___________________________

Chapter 3 Areas to Work on

__________________________
__________________________

Chapter 4 Checkpoint Score ___________________________

Chapter 4 Areas to Work on

__________________________
__________________________
Participant Feedback

Chapter _________ Class Time and Date ________________
Name _______________________________________

1. What problems are you having with this chapter? How can we help?
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________

2. How will you be able to use this information on the floor?
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________

3. What can be done to improve this course?
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________
   ____________________________________________________
NOTICE

REPRODUCTION BASIS

☐ This document is covered by a signed "Reproduction Release (Blanket) form (on file within the ERIC system), encompassing all or classes of documents from its source organization and, therefore, does not require a "Specific Document" Release form.

☒ This document is Federally-funded, or carries its own permission to reproduce, or is otherwise in the public domain and, therefore, may be reproduced by ERIC without a signed Reproduction Release form (either "Specific Document" or "Blanket").