

## Module Overview

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The ability to communicate effectively is essential to the safe operation of a crane. This module covers the fundamentals of the communication process. It addresses abstractions, fear, lack of common experience, and environmental factors. Verbal and nonverbal methods of communication are covered. This module also takes an in-depth look at the *ASME B30.5* hand signals, including the appropriate operator action when the signal is given and the expected machine movement.

## Objectives

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Upon completion of this module, the trainee will be able to do the following:

1. Communicate effectively at the job site with management, the crew, and the crane operator.
2. Demonstrate the standard hand signals as specified in the *ASME Standards*.
3. Describe the signaling procedure used when multiple signal persons are required.
4. Identify the various methods of communication on the job.
5. Demonstrate communication procedures using a handheld radio.

## Performance Tasks

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Under the supervision of the instructor, the trainee should be able to do the following:

1. Demonstrate the proper use of hand signals as specified by the *ASME Standards*.
2. Direct an operator to move and place a load using the appropriate hand signals.
3. Demonstrate communication procedures using a handheld radio.

## Materials and Equipment List

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Multimedia projector and screen  
*Signal Person* PowerPoint® Presentation Slides  
(ISBN 978-0-13-257344-3)  
Computer  
Whiteboard/chalkboard  
Markers/chalk  
Pencils and scratch paper  
Appropriate personal protective equipment

Handheld radios  
Mobile crane or simulator  
*ASME B30 Standards*  
Copies of the Quick Quiz\*  
Module Examinations\*\*  
Performance Profile Sheets\*\*

\* Located in the back of this module.

\*\* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## Safety Considerations

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Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. The module requires trainees to use hand signals to direct a mobile crane or simulator. Ensure trainees are properly briefed on site safety procedures.

## Additional Resources

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This module presents thorough resources for task training. The following resource material is suggested for further study.

- ASME B30.2 Standard*, Latest Edition.
- ASME B30.3 Standard*, Latest Edition.
- ASME B30.5 Standard*, Latest Edition.

## Teaching Time for This Module

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An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 10 hours are suggested to cover *Communication*. You will need to adjust the time required for testing based on your class size and resources. Because laboratories often correspond to Performance Tasks, the proficiency of the trainees may be noted during these exercises for Performance Testing purposes.

Topic	Planned Time
<b>Session I. Introduction; Communication Process; Effective Communication; Methods and Modes of Communication, Part I</b>	
A. Introduction	_____
B. Communication Process	_____
1. Sending the Message	_____
2. Receiving the Message	_____
3. Feedback	_____
C. Effective Communication	_____
1. Lack of Common Experience	_____
2. Verbal Communication Problems	_____
3. Environmental Factors	_____
D. Methods and Modes of Communication	_____
1. Verbal Modes of Communication	_____
E. Laboratory	_____
Have trainees practice correct communication procedures using a handheld radio. This laboratory corresponds to Performance Task 3.	
<b>Session II. Methods and Modes of Communication, Part II</b>	
A. Methods and Modes of Communication	_____
1. Nonverbal Modes of Communication	_____
B. Laboratory	_____
Have trainees practice the proper use of hand signals as specified by the ASME Standards. This laboratory corresponds to Performance Task 1.	
<b>Session III. Multiple-Crane Lifting Operations; Multiple Signal Persons</b>	
A. Multiple-Crane Lifting Operations	_____
B. Multiple Signal Persons	_____
C. Laboratory	_____
Have trainees practice directing an operator to move and place a load using the appropriate hand signals. This laboratory corresponds to Performance Task 2.	
<b>Session IV. Review and Testing</b>	
A. Review	_____
B. Module Examination	_____
1. Trainees must score 70 percent or higher to receive recognition from NCCER.	
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.	
C. Performance Testing	_____
1. Trainees must perform each task to the satisfaction of the instructor to receive recognition from NCCER. If applicable, proficiency noted during laboratory exercises can be used to satisfy the Performance Testing requirements.	
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.	

## Module Overview

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This module explains the basic principles of cranes with an in-depth discussion of the terminology and nomenclature. The principles of a fulcrum and lever and center of gravity are explained in relation to crane operations.

## Prerequisites

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Prior to training with this module, it is recommended that the trainee shall have successfully completed *Signal Person*, Module 53101-11.

## Objectives

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Upon completion of this module, the trainee will be able to do the following:

1. Identify the types of mobile cranes found on construction sites.
2. Identify mobile crane components and boom attachments.
3. Identify mobile crane reeving patterns.
4. Define the effects of leverage as it applies to mobile cranes.
5. Define the factors affecting mobile crane lifting capacities.
6. Discuss the criteria for a critical lift.
7. Describe the effects of load movement on measured radius.
8. Define the effects of a submerged lift on crane capacity.

## Performance Tasks

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There are no performance tasks for this module.

## Materials and Equipment

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Multimedia projector and screen  
*Signal Person* PowerPoint® Presentation Slides  
(ISBN 978-0-13-257344-3)  
Computer  
Whiteboard/chalkboard  
Markers/chalk  
Pencils and scratch paper  
Appropriate personal protective equipment,  
including:  
    Hard hats  
    Work gloves  
    Safety harnesses  
    Safety shoes  
    Ear protection  
Model crane (hydraulic boom)

Model crane (lattice boom)  
Crane blocks or pulley systems  
Materials to construct a simple teeter-totter  
Materials of different weights to use as loads on  
    the teeter-totter  
Matting material to support a crane  
Copies of company safety policies and proce-  
    dures  
Copies of manufacturers' operating manuals and  
    load charts  
Fishing pole  
Small swimming pool  
Module Examinations\*  
Performance Profile Sheets\*

\* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## Safety Considerations

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Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly. Emphasize heavy equipment and work site safety. The topics in this module require the trainee to observe cranes in different configurations. This may require that the trainees visit job sites or crane yards. Ensure that the trainees are briefed on site safety policies prior to any site visits.

## Additional Resources

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This module presents thorough resources for task training. The following resource material is suggested for further study.

*Crane Setup*, Latest Edition. Sanford, FL: Crane Institute of America, Inc.

*Cranes: Design, Practice and Maintenance*, 1999. Ing J. Verschoof. London: Professional Engineering Publishing, Ltd.

*Cranes in Action*, 2000. Larry Shapiro. Osceola, WI: Motorbooks International.

*IPT's Crane and Rigging Handbook*, 1991. Ronald G. Garby. Clinton, NC: Construction Trades Press.

*Machinery's Handbook*, 2000. Erik Oberg, et al. New York, NY: Industrial Press, Inc.

*Mobile Crane Manual*, 1999. Donald E. Dickie, D.H. Campbell. Toronto, Ontario: Construction Safety Association of Ontario.

*Mobile Craning Today*, Latest Edition. Morrisburg, Ontario: Operating Engineers Training Institute of Ontario.

## Teaching Time for This Module

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An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover *Basic Principles of Cranes*. You will need to adjust the time required for testing based on your class size and resources.

Topic	Planned Time
<b>Session I. Introduction; Mobile Construction Cranes; Crane Terminology; Crane Reeving Patterns</b>	
A. Introduction	_____
B. Mobile Construction Cranes	_____
1. Crawler Cranes	_____
2. Wheeled Truck Cranes	_____
3. Wheeled Rough-Terrain Cranes	_____
C. Crane Terminology	_____
1. Component Terminology	_____
2. Operations Terminology	_____
3. Counterweights	_____
4. Jibs	_____
5. Pendants and Hoist Lines	_____
6. Telescoping Boom	_____
D. Crane Reeving Patterns	_____
<b>Session II. Factors Affecting Lifting Capacity, Part One</b>	
A. Factors Affecting Lifting Capacity	_____
1. Ground Conditions	_____
2. Bearing Surface	_____
3. Crane Base	_____
4. Center of Gravity	_____
5. Quadrant of Operation	_____

**Sessions III and IV. Factors Affecting Lifting Capacity, Part Two**

A. Factors Affecting Lifting Capacity

1. Boom Length, Boom Angle, Operating Radius, and Boom Point Elevation
2. Swing Out, Side Loading, and Dynamic Loading
3. Capacity (Load) Charts
4. Wind Effect on Stability

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**Session V. Critical Lifts; Boom Stops and Angle Indicators; Submerged Lifts**

A. Critical Lifts

B. Boom Stops and Angle Indicators

1. Crane Safety Features

C. Submerged Lifts

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**Session VI. Review and Testing**

A. Review

B. Module Examination

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.

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## Module Overview

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This module introduces various safety aspects of mobile crane operations. Communications, job site hazards, and personal safety issues are covered.

## Prerequisites

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Prior to training with this module, it is recommended that the trainee shall have successfully completed the *Signal Person* Modules 53101-11 and 38204-11.

## Objectives

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Upon completion of this module, the trainee will be able to do the following:

1. Identify basic mobile crane safety and rigging procedures.
2. Identify and explain how to avoid the swing paths of a crane.
3. Identify site and environmental hazards associated with mobile cranes.
4. State the safety practices associated with driving a mobile crane.

## Performance Tasks

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There are no performance tasks for this module.

## Materials and Equipment

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Multimedia projector and screen

*Signal Person* PowerPoint® Presentation Slides  
(ISBN 978-0-13-257344-3)

Computer

Whiteboard/chalkboard

Markers/chalk

Pencils and scratch paper

Appropriate personal protective equipment

Standard hand signals chart

Copies of safety policies and procedures

Copies of ANSI and OSHA standards

Weights

Fishing pole

Copies of site evacuation procedures

Copies of material safety data sheets (MSDSs)

Model crane (hydraulic boom)

Model crane (lattice boom)

Manufacturer's operator/maintenance manual

Module Examinations\*

\* Single-module AIG purchases include the printed exam and performance task sheet. If you have purchased the perfect-bound version of this title, download these materials from the IRC using your access code.

## Safety Considerations

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Ensure that the trainees are equipped with appropriate personal protective equipment and know how to use it properly.

## Additional Resources

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This module presents thorough resources for task training. The following resource material is suggested for further study.

*Crane Safety on Construction Sites*, 1998. Task Committee on Crane Safety on Construction Sites. Reston, VA: ASCE.

*Rigging Handbook*, 2003. Jerry A. Klinke. Stevensville, MI: ACRA Enterprises, Inc.

## Teaching Time for This Module

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An outline for use in developing your lesson plan is presented below. Note that each Roman numeral in the outline equates to one session of instruction. Each session has a suggested time period of 2½ hours. This includes 10 minutes at the beginning of each session for administrative tasks and one 10-minute break during the session. Approximately 15 hours are suggested to cover *Crane Safety*. You will need to adjust the time required for hands-on activity and testing based on your class size and resources.

Topic	Planned Time
<b>Session I. Introduction; General Safety</b>	
A. Introduction	_____
B. General Mobile Crane Safety	_____
1. Personal Protection	_____
2. Equipment and Supervision	_____
3. Basic Rigging Precautions	_____
4. ASME Hand Signals	_____
<b>Session II. Load Control; Safety Standards</b>	
A. Load Control	_____
1. Load Path, Load Control, and Tag Lines	_____
2. Load-Handling Safety	_____
B. Safety Standards	_____
1. OSHA Standards	_____
2. Manufacturers' Standards	_____
3. Corporate Policies and Procedures	_____
<b>Session III. Power Lines; Site Safety</b>	
A. Working Around Power Lines	_____
B. Site Safety	_____
1. Site Hazards and Restrictions	_____
2. Manufacturers' Requirements and Restrictions	_____
<b>Session IV. Emergency Response</b>	
A. Fire	_____
B. Malfunctions During Lifting Operations	_____
C. Hazardous Weather	_____
<b>Session V. Moving Cranes Safely; Using Cranes to Lift Personnel</b>	
A. Moving Cranes Safely	_____
B. Using Cranes to Lift Personnel	_____



## Session VI. Review and Testing

A. Review

B. Module Examination

1. Trainees must score 70 percent or higher to receive recognition from NCCER.
2. Record the testing results on Training Report Form 200, and submit the results to the Training Program Sponsor.



