



**NATIONAL COMMISSION FOR THE
CERTIFICATION OF CRANE OPERATORS (NCCCO)**

SIGNALPERSON REFERENCE MANUAL

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Preface

This manual has been provided as a reference source for candidates preparing to take the National Commission for the Certification of Crane Operators (NCCCO) Signalperson Certification Exam. The information contained herein has been compiled from a number of different sources. These sources and the relevant material selected for inclusion in this reference manual are as follows:

- ASME B30.5-2011—Mobile and Locomotive Cranes, Section 5-3.3: Signals
- ASME B30.3-2012—Tower Cranes, Section 3-3.3: Signals
- OSHA 29 CFR Part 1926—Subpart CC: Cranes and Derricks Used in Construction (Sections 1419-1422, and 1428: Signalperson Requirements and Qualifications)
- Voice Signal Communication

Please note that candidates should be familiar with all sections of ASME B30.5-2011 and OSHA 29 CFR Part 1926 relevant to crane operations and signaling.

The material contained herein is not intended to be used for any other purpose than reference material in association with preparing for the NCCCO examinations. No part of this manual is to be copied or used in any manner other than by individual candidates preparing for the NCCCO Signalperson examination.

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CHAPTER 1:
**ASME B30.5–2011—Mobile and
Locomotive Cranes**

Section 5-3.3: Signals

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Section 5-3.3: Signals

5-3.3.1 General

- a. Communication between the crane operator and the signalperson shall be maintained continuously during all crane movements. If at any time communication is disrupted, the operator shall stop all crane movements until communication is restored and a proper signal is given and understood.
- b. If the operator has any concerns regarding the requested movement of the crane or needs to communicate with the signalperson, the operator shall stop all crane movement. Crane movement shall not resume until the operator and the signalperson agree the issue at hand has been resolved.
- c. If it is desired to give instructions to the operator, other than those provided by the established signal system, the crane movements shall be stopped.

5-3.3.2 Standard Signals

Standard signals to the operator shall be in accordance with the standards prescribed in para. 5-3.3.4 or 5-3.3.5. Signals shall be discernible or audible at all times. No response shall be made unless signals are clearly understood.

5-3.3.3 Signalperson Qualifications

Prior to signaling crane operations, all signalpersons shall be tested by a designated person and demonstrate their qualifications in the following areas:

- a. basic understanding of crane operation and limitations
- b. standard hand signals described in para. 5-3.3.4 whenever hand signals are used
- c. standard voice signals described in para. 5-3.3.5 whenever voice signals are used

5-3.3.4 Standard Hand Signals

Hand signals shall be as shown in Fig. 5-3.3.4-1 and shall be posted conspicuously at the job site.

5-3.3.5 Standard Voice Signals

Prior to beginning lifting operations using voice signals, the signals shall be discussed and agreed upon by the person directing lifting operations, the crane operator, and the appointed signalperson.

- a. Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin. If the system is

battery powered, extra batteries should be available at the job site.

- b. Prior to commencing a lift, the operator and signalperson shall contact and identify each other.
- c. All directions given to the crane operator by the signalperson shall be given from the operator's direction perspective (e.g., swing right).
- d. Each series of voice signals shall contain three elements stated in the following order:
 1. function and direction
 2. distance and/or speed
 3. function stop
- e. For lifting operations using voice signals, the person directing lifting operations shall consider the complexity of the lift, the capabilities of the particular crane, the experience and skill of the operator and signalperson, and the ability to communicate the necessary signals before permitting multiple simultaneous crane function signals.

5-3.3.6 Special Signals

For operations or crane attachments not covered by para. 5-3.3.4, 5-3.3.5, or 5-3.3.7, additions to or modifications of the standard signal procedures may be required.

In all such cases, the required special signals shall be agreed upon in advance by the person directing lifting operations, the crane operator, and the signalperson.

These special signals should not be in conflict with the standard signals.

5-3.3.7 Audible Travel Signals

When moving the vehicle, the following signals shall be used:

- a. STOP: one short audible signal
- b. GO AHEAD: two short audible signals
- c. BACK UP: three short audible signals

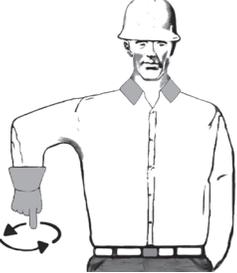
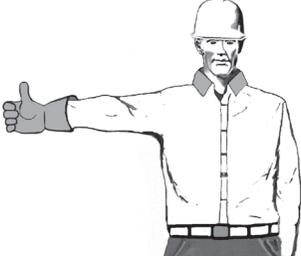
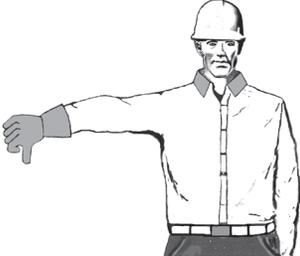
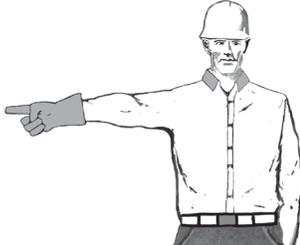
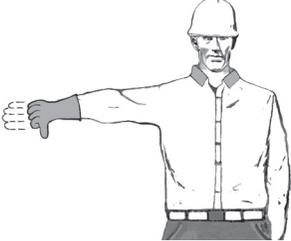
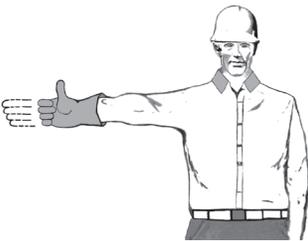
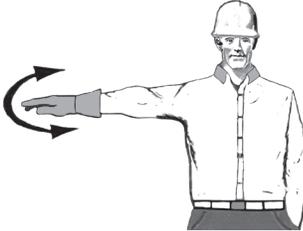
5-3.3.8 Audible Emergency Signal

Emergency signals can be given by anyone. The signal used shall be agreed upon for each job site location and it shall meet the requirements of para. 5-3.3.6 (e.g., multiple short audible signals or a continuous audible signal).



Standard Hand Signals

FOR CONTROLLING MOBILE CRANE OPERATIONS

 <p>HOIST</p> <p>With upper arm extended to the side, forearm and index finger pointing straight up, hand and finger make small circles.</p>	 <p>LOWER</p> <p>With arm and index finger pointing down, hand and finger make small circles.</p>	 <p>USE MAIN HOIST</p> <p>A hand taps on top of the head. Then regular signal is given to indicate desired action.</p>	 <p>USE WHIPLINE (Auxiliary Hoist)</p> <p>With arm bent at elbow and forearm vertical, elbow is tapped with other hand. Then regular signal is used to indicate desired action.</p>
 <p>BOOM UP</p> <p>With arm extended horizontally to the side, thumb points up with other fingers closed.</p>	 <p>BOOM DOWN</p> <p>With arm extended horizontally to the side, thumb points down with other fingers closed.</p>	 <p>MOVE SLOWLY</p> <p>A hand is placed in front of the hand that is giving the action signal. (Hoist slowly shown in example.)</p>	 <p>SWING</p> <p>With arm extended horizontally, index finger points in direction that boom is to swing.</p>
 <p>BOOM DOWN AND RAISE THE LOAD</p> <p>With arm extended horizontally to the side and thumb pointing down, fingers open and close while load movement is desired.</p>	 <p>BOOM UP AND LOWER THE LOAD</p> <p>With arm extended horizontally to the side and thumb pointing up, fingers open and close while load movement is desired.</p>	 <p>STOP</p> <p>With arm extended horizontally to the side, palm down, arm is swung back and forth.</p>	 <p>EMERGENCY STOP</p> <p>With both arms extended horizontally to the side, palms down, arms are swung back and forth.</p>



TRAVEL

With all fingers pointing up, arm is extended horizontally out and back to make a pushing motion in the direction of travel.



DOG EVERYTHING

Hands held together at waist level.



TRAVEL (BOTH TRACKS)

Rotate fists around each other in front of body; direction of rotation towards body indicates travel forward; rotation away from body indicates travel backward.
(For crawler cranes only)



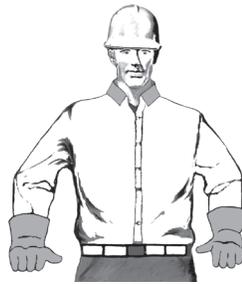
TRAVEL (ONE TRACK)

Indicate track to be locked by raising fist on that side. Rotate other fist in front of body in direction that other track is to travel.
(For crawler cranes only)



TELESCOPE OUT (TELESCOPING BOOMS)

With hands to the front at waist level, thumbs point outward with other fingers closed.



TELESCOPE IN (TELESCOPING BOOMS)

With hands to the front at waist level, thumbs point at each other with other fingers closed.



TELESCOPE OUT (TELESCOPING BOOMS)

One hand signal. One fist in front of chest with thumb tapping chest.



TELESCOPE IN (TELESCOPING BOOMS)

One hand signal. One fist in front of chest, thumb pointing outward and heel of fist tapping chest.

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CHAPTER 2:
ASME B30.3–2012—Tower Cranes

Section 3-3.3: Signals

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Section 3-3.3: Signals

3-3.3.1 General

- a. Continuous communication between the crane operator and the signal person shall be maintained during all crane operations. If at any time communication is disrupted, the operator shall stop all crane operations until communication is restored and a proper signal is given and understood.
- b. If the operator has any concerns regarding the signaled movement of the crane or needs to communicate with the signal person, the operator shall stop all crane operations. Crane operations shall not resume until the operator and the signal person agree that the issue at hand has been resolved.
- c. If it is desired to give instructions to the operator other than those provided by the established signal system, the crane operation shall be stopped.

3-3.3.2 Standard Signals

Standard signals to the operator shall be in accordance with the standards prescribed in paras. 3-3.3.4 and 3-3.3.5, unless voice communication equipment (telephone, radio, or equivalent) is utilized. No crane motion or speed change shall be made unless signals are clearly understood.

3-3.3.3 Signal Person Qualifications

Prior to signaling crane operations, all signal persons shall be tested by a qualified person and have demonstrated their qualifications in the following areas:

- a. basic understanding of crane operation and limitations
- b. standard hand signals described in para. 3-3.3.4 whenever hand signals are used
- c. standard voice signals described in para. 3-3.3.5 whenever voice signals are used

3-3.3.4 Standard Hand Signals

Hand signals shall be in accordance with Fig. 3-3.3.4-1 and shall be posted at the work site.

3-3.3.5 Standard Voice Signals

Prior to beginning lifting operations using voice signals, the signals shall be discussed and agreed upon by the person directing lifting operations, the crane operator, and the designated signal person.

- a. Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin.
- b. Prior to commencing a lift, the operator and signal person shall contact and identify each other.
- c. All directions given to the crane operator by the signal person shall be given from the operator's direction perspective (e.g., swing right).
- d. Each series of voice signals shall contain three elements stated in the following order:
 1. function and direction
 2. distance and/ or speed
 3. function stop
- e. For lifting operations using voice signals, the lift director shall consider the complexity of the lift, the capabilities of the crane, and the ability to communicate the necessary signals before permitting multiple simultaneous crane functions.

3-3.3.6 Special Signals

For operations not covered by paras. 3-3.3.4 and 3-3.3.5, or for special conditions that could affect operations, additions to or modifications of the standard signals may be required. In these cases, special signals shall be agreed upon in advance by the operator and the signal person, and should not be in conflict with standard signals.

3-3.3.7 Audible Emergency Signal

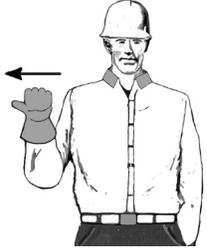
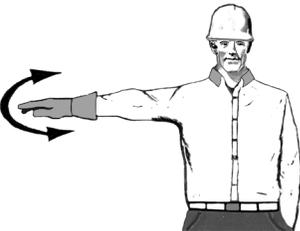
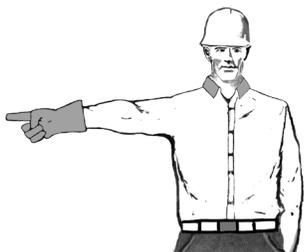
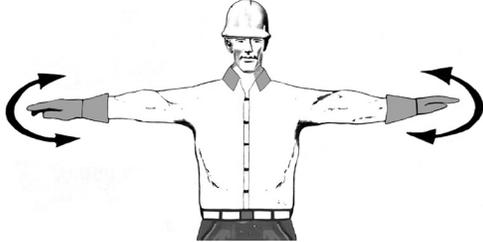
Emergency signals can be given by anyone. The signal used shall be agreed upon for each job site and meet the requirements of para. 3-3.3.6 (e.g., multiple short audible or a continuous audible signal).

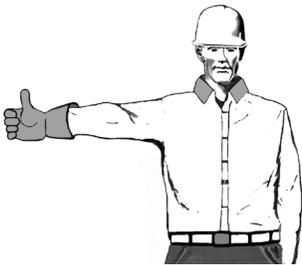
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Standard Hand Signals

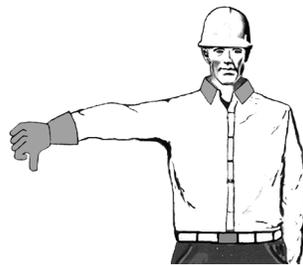
FOR CONTROLLING TOWER CRANE OPERATIONS

 <p>HOIST</p> <p>With upper arm extended to the side, forearm and index finger pointing straight up, hand and finger make small circles.</p>	 <p>LOWER</p> <p>With arm and index finger pointing down, hand and finger make small circles.</p>	 <p>TOWER TRAVEL</p> <p>With all fingers pointing up, arm is extended horizontally out and back to make a pushing motion in the direction of travel.</p>	 <p>TROLLEY TRAVEL</p> <p>With palm up, fingers closed, and thumb pointing in direction of motion, hand is jerked in direction trolley is to travel.</p>
 <p>STOP</p> <p>With arm extended horizontally to the side, palm down, arm is swung back and forth.</p>	 <p>DOG EVERYTHING</p> <p>Hands held together at waist level.</p>	 <p>MOVE SLOWLY</p> <p>A hand is placed in front of the hand that is giving the action signal. (Hoist slowly shown in example.)</p>	 <p>SWING</p> <p>With arm extended horizontally, index finger points in direction that boom is to swing.</p>
 <p>EMERGENCY STOP</p> <p>With both arms extended horizontally to the side, palms down, arms are swung back and forth.</p>			



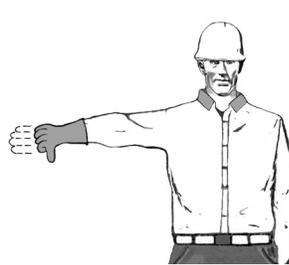
BOOM UP

With arm extended horizontally to the side, thumb points up with other fingers closed.



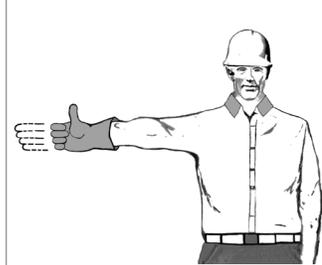
BOOM DOWN

With arm extended horizontally to the side, thumb points down with other fingers closed.



BOOM DOWN & RAISE THE LOAD

With arm extended horizontally to the side and thumb pointing down, fingers open and close while load movement is desired.



BOOM UP & LOWER THE LOAD

With arm extended horizontally to the side and thumb pointing up, fingers open and close while load movement is desired.



CHAPTER 3:
**OSHA 29 CFR 1926—Signal Person
Requirements and Qualifications**

**OSHA 29 CFR 1926—
Signal Person Requirements
and Qualifications**

- **Section 1926.1419: Signals—General Requirements**
- **Section 1926.1420: Signals—Radio, Telephone or other Electronic Transmission of Signals**
- **Section 1926.1421: Signals—Voice Signals—Additional Requirements**
- **Section 1926.1422: Signals—Hand Signal Chart**
- **Section 1926.1428: Signal Person Qualifications**

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CHAPTER 3: OSHA 29 CFR 1926—Signal Person Requirements and Qualifications

Sec. 1926.1419 Signals—general requirements

(a) A signal person must be provided in each of the following situations:

(1) The point of operation, meaning the load travel or the area near or at load placement, is not in full view of the operator.

(2) When the equipment is traveling, the view in the direction of travel is obstructed.

(3) Due to site specific safety concerns, either the operator or the person handling the load determines that it is necessary.

(b) Types of signals. Signals to operators must be by hand, voice, audible, or new signals.

(c) Hand signals.

(1) When using hand signals, the Standard Method must be used (see Appendix A of this subpart). Exception: Where use of the Standard Method for hand signals is infeasible, or where an operation or use of an attachment is not covered in the Standard Method, non-standard hand signals may be used in accordance with paragraph (c)(2) of this section.

(2) Non-standard hand signals. When using non-standard hand signals, the signal person, operator, and lift director (where there is one) must contact each other prior to the operation and agree on the non-standard hand signals that will be used.

(d) New signals. Signals other than hand, voice, or audible signals may be used where the employer demonstrates that:

(1) The new signals provide at least equally effective communication as voice, audible, or Standard Method hand signals, or

(2) The new signals comply with a national consensus standard that provides at least equally effective communication as voice, audible, or Standard Method hand signals.

(e) Suitability. The signals used (hand, voice, audible, or new), and means of transmitting the signals to the operator (such as direct line of sight, video, radio, etc.), must be appropriate for the site conditions.

(f) During operations requiring signals, the ability to transmit signals between the operator and signal person must be maintained. If that ability is interrupted at any time, the operator must safely stop operations requiring signals until it is reestablished and a proper signal is given and understood.

(g) If the operator becomes aware of a safety problem and needs to communicate with the signal person, the operator must safely stop operations. Operations must not resume until the operator and signal person agree that the problem has been resolved.

(h) Only one person may give signals to a crane/derrick at a time, except in circumstances covered by paragraph (j) of this section.

(i) [Reserved.]

(j) Anyone who becomes aware of a safety problem must alert the operator or signal person by giving the stop or emergency stop signal. (Note: Sec. 1926.1417(y) requires the operator to obey a stop or emergency stop signal).

(k) All directions given to the operator by the signal person must be given from the operator's direction perspective.

(l) [Reserved.]

(m) Communication with multiple cranes/derricks. Where a signal person(s) is in communication with more than one crane/derrick, a system must be used for identifying the crane/derrick each signal is for, as follows:

(1) for each signal, prior to giving the function/direction, the signal person must identify the crane/derrick the signal is for, or

(2) must use an equally effective method of identifying which crane/derrick the signal is for.

Sec. 1926.1420 Signals—radio, telephone or other electronic transmission of signals

(a) The device(s) used to transmit signals must be tested on site before beginning operations to ensure that the signal transmission is effective, clear, and reliable.

(b) Signal transmission must be through a dedicated channel, except:

(1) Multiple cranes/derricks and one or more signal persons may share a dedicated channel for the purpose of coordinating operations.

(2) Where a crane is being operated on or adjacent to railroad tracks, and the actions of the crane operator need to be coordinated with the movement of other equipment or trains on the same or adjacent tracks.

(c) The operator's reception of signals must be by a hands-free system.

Sec. 1926.1421 Signals—voice signals—additional requirements

(a) Prior to beginning operations, the operator, signal person and lift director (if there is one), must contact each other and agree on the voice signals that will be used. Once the voice signals are agreed upon, these workers need not meet again to discuss voice signals unless another worker is added or substituted, there is confusion about the voice signals, or a voice signal is to be changed.

(b) Each voice signal must contain the following three elements, given in the following order: function (such as hoist, boom, etc.), direction; distance and/or speed; function, stop command.

(c) The operator, signal person and lift director (if there is one), must be able to effectively communicate in the language used.

Sec. 1926.1422 Signals—hand signal chart

Hand signal charts must be either posted on the equipment or conspicuously posted in the vicinity of the hoisting operations.

Sec. 1926.1428 Signal person qualifications

(a) The employer of the signal person must ensure that each signal person meets the Qualification Requirements (paragraph (c) of this section) prior to giving any signals. This requirement must be met by using either Option (1) or Option (2) of this section.

(1) Option (1)—Third party qualified evaluator. The signal person has documentation from a third party qualified evaluator (see Qualified Evaluator (third party), Sec. 1926.1401 for definition) showing that the signal person meets the Qualification Requirements (see paragraph (c) of this section).

(2) Option (2)—Employer's qualified evaluator. The employer's qualified (see Qualified Evaluator (not a third party), Sec. 1926.1401 for definition) evaluator assesses the individual and determines that the individual meets the Qualification Requirements (see paragraph (c) of this section) and provides documentation of that determination. An assessment by an employer's qualified evaluator under this option is not portable—other employers are not permitted to use it to meet the requirements of this section.

(3) The employer must make the documentation for whichever option is used available at the site while the signal person is employed by the employer. The docu-

mentation must specify each type of signaling (e.g. hand signals, radio signals, etc.) for which the signal person meets the requirements of paragraph (c) of this section.

(b) If subsequent actions by the signal person indicate that the individual does not meet the Qualification Requirements (see paragraph (c) of this section), the employer must not allow the individual to continue working as a signal person until re-training is provided and a re-assessment is made in accordance with paragraph (a) of this section that confirms that the individual meets the Qualification Requirements.

(c) Qualification Requirements. Each signal person must:

(1) Know and understand the type of signals used. If hand signals are used, the signal person must know and understand the Standard Method for hand signals.

(2) Be competent in the application of the type of signals used.

(3) Have a basic understanding of equipment operation and limitations, including the crane dynamics involved in swinging and stopping loads and boom deflection from hoisting loads.

(4) Know and understand the relevant requirements of Sec. 1926.1419 through Sec. 1926.1422 and Sec. 1926.1428.

(5) Demonstrate that he/she meets the requirements in paragraphs (c)(1) through (4) of this section through an oral or written test, and through a practical test.



CHAPTER 4:
Voice Signal Communication

Voice Signal Communication

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CHAPTER 4: Voice Signal Communication

Prior to Lifting Operations

Prior to beginning lifting operations using voice signals, the signals shall be discussed and agreed upon by the person directing lifting operations, the crane operator, and the appointed signalperson.

Telephones, radios, or equivalent, if used, shall be tested before lifting operations begin. If the system is battery powered, extra batteries should be available at the job site.

Prior to commencing a lift, the operator and signalperson shall contact and identify each other.

- Begin by calling for the operator by name
- Operator will acknowledge with the signalperson's name

Voice Command Basics

The devices used to transmit signals shall be tested on site before beginning operations to ensure that the signal transmission is clear and reliable.

Signal transmission must be through a dedicated channel. Exception: Multiple cranes/derricks and one or more signalpersons may share a dedicated channel for the purpose of coordinating operations.

The operator's reception of signals must be by a hands-free system.

Cautions regarding radio use may include the following:

- Awareness of any explosive devices in general area (radio transmissions have been known to cause premature detonation of explosives that use electric detonators)
- Other electronics (potential for interference)
- Other radios nearby operating on the same frequency

Elements of Voice Signals

Each series of voice signals shall contain three elements stated in the following order:

1. Function and direction
2. Distance and/or speed
3. Function stop

Function names should be the same as the ASME B30 standard hand signal names.

Here are some examples of correct voice signals:

- *Swing right 50 feet, 25 feet, 15 feet, 10 feet, 5 feet, 2 feet, swing stop*
- *Lower load 100 feet, 50 feet, 40 feet, 30 feet, 2 feet, lower stop*
- *Hoist load slow, slow, keep hoisting, slow, hoist stop*

When giving swing command, the signalperson will give directions from the operator's perspective.

When describing distance, give the distance remaining, not the distance traveled.

- *Lower 50 feet, 40 feet, keep lowering 30 feet, 20 feet, 10 feet 5 feet, 3, 2, 1, lower stop*

Let the operator know when he/she is close to the spot that he/she is to stop.

- *... about three feet, two feet, one foot, swing stop*

Once the task has begun the signalperson should never break communication with the operator – this is referred to as maintaining “constant communication.”

All voice commands must be clear, clean, and constant.

Never unkey the microphone while the load is moving. The signalperson should maintain constant communication to let operator know everything is all right.

- *slowly down, slow, slow, slow...*

If signalperson breaks communications, the operator should stop immediately. The operator will then acknowledge the signalperson by name and will continue only when signalperson regains constant communication.

If the operator sees something and needs to communicate with the signalperson, the operator will stop and give one blast of the horn to alert the signalperson. The signalperson will break constant communication and the operator will notify the signalperson of the problem.

It is helpful for the signalperson to give a detailed ongoing description of the parts of the lift that the operator cannot see (i.e., operating “in the blind”). The goal is to “paint a picture” for the operator in these situations.

Acceptable Voice Signal Terminology

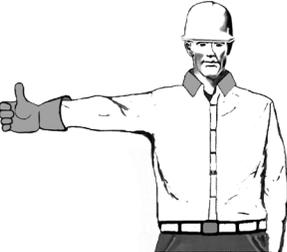
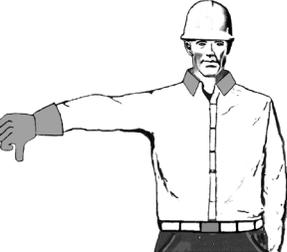
The following table illustrates all of the acceptable Voice Signals that will be considered correct during the NCCCO Signalperson Practical Examination. The words and word order must be followed exactly when giving signals in an effort to remain consistent. Transposing the function and direction (e.g., “Up hoist”) or function and stop (e.g., “Stop Hoist”) will be considered incorrect.

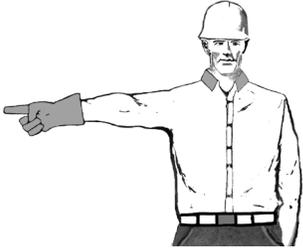
When initiating a function, articles such as “the” or “a” may be used as well as a combination of the acceptable terms (e.g., “Hoist the load” or “Hoist up the load hook” are both considered correct).

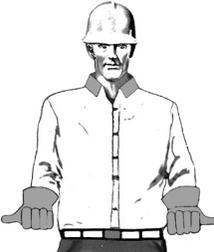
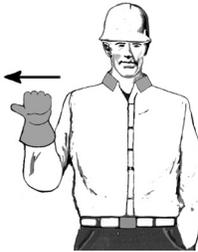
When terminating a function, the signalperson must communicate to the operator using only “[Function] stop” to ensure the operator ends the operation. Any additional words are considered incorrect signals. See the following table for the correct terminology to stop each function.

Some voice signal functions inherently give a direction as well (e.g., “Hoist” or “Lower”). For those that are simply a function, be sure to include a direction when initiating the function (e.g., “Swing RIGHT” or “Trolley OUT”).

NOTE: “SLOWLY” can be used at any time with any signal. “SLOWLY” is always at the end of the command (e.g., “Hoist load SLOWLY”).

Corresponding Hand Signal	Function	Initiate Function	Terminate Function
	HOIST	“Hoist” “Hoist up” “Hoist load” “Hoist hook” “Raise load” “Raise hook”	“Hoist stop”
	LOWER	“Lower” “Lower down” “Lower load” “Lower hook”	“Lower stop”
	BOOM UP	“Boom up” “Raise boom”	“Boom stop”
	BOOM DOWN	“Boom down” “Lower boom”	“Boom stop”

Corresponding Hand Signal	Function	Initiate Function	Terminate Function
	SWING	"Swing right" "Swing left"	"Swing stop"
	TRAVEL	"Travel forward" "Travel reverse"	"Travel stop"
	DOG EVERYTHING	"Dog everything"	N/A
	USE MAIN HOIST (Mobile Crane ONLY)	"Use main hoist" "Use main drum"	N/A
	USE WHIPLINE (AUXILIARY HOIST) (Mobile Crane ONLY)	"Use whipline" "Use auxiliary hoist" "Use auxiliary drum"	N/A

Corresponding Hand Signal	Function	Initiate Function	Terminate Function
	TRAVEL (BOTH TRACKS) (Mobile Crawler Cranes ONLY)	"Travel both tracks forward" "Travel both tracks reverse"	"Travel stop"
	TRAVEL (ONE TRACK) (Mobile Crawler Cranes ONLY)	"Travel left track forward" "Travel left track reverse" "Travel right track forward" "Travel right track reverse"	"Travel stop"
	TELESCOPE OUT (Mobile Telescopic Boom Cranes ONLY)	"Telescope out" "Extend boom"	"Telescope stop" "Extend stop"
	TELESCOPE IN (Mobile Telescopic Boom Cranes ONLY)	"Telescope in" "Retract boom"	"Telescope stop" "Retract stop"
	TROLLEY TRAVEL (Tower Cranes ONLY)	"Trolley in" "Trolley out"	"Trolley stop"

IMPORTANT CONTACT INFORMATION



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